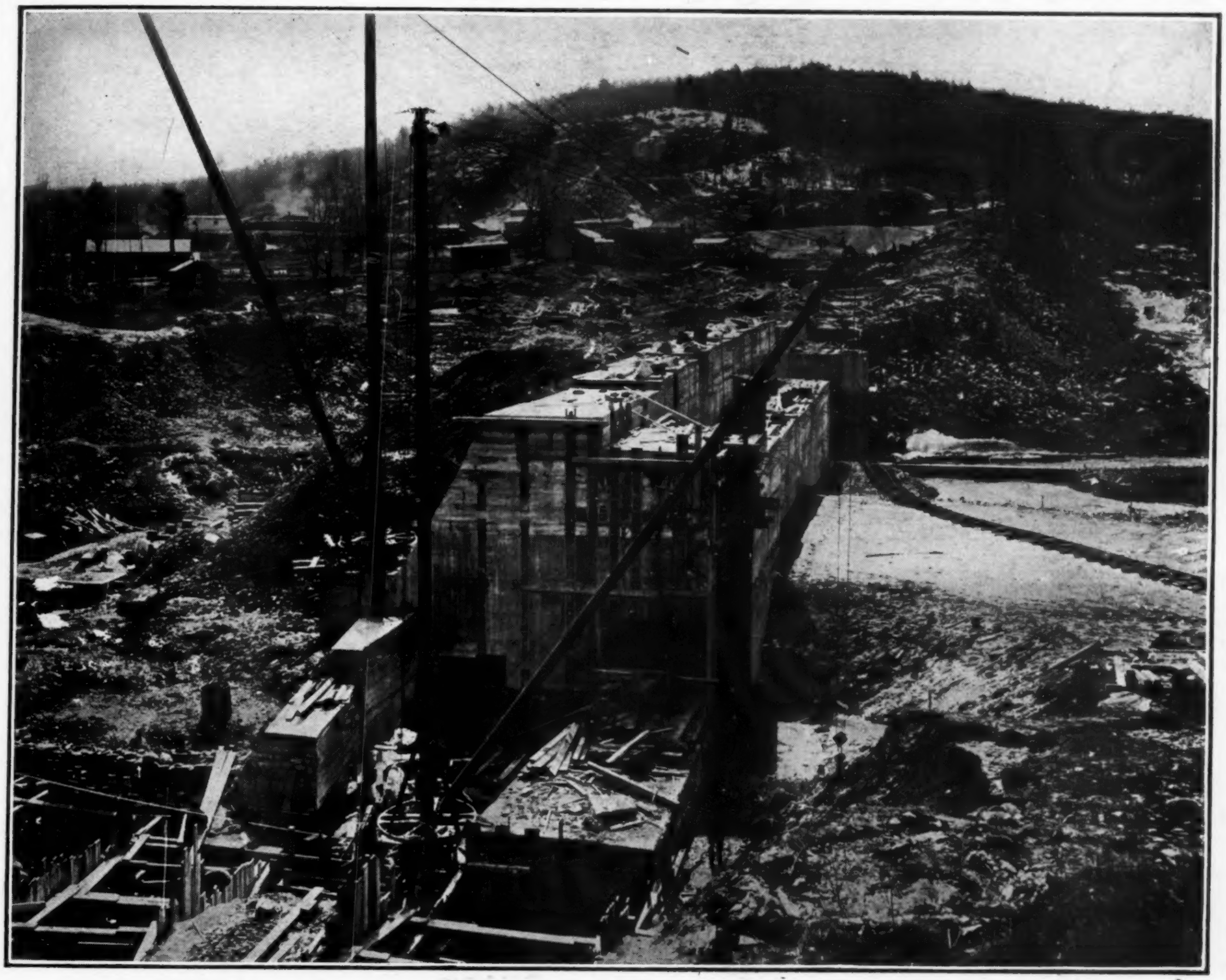
PUBLIC WORKS

CITY COUNTY STATE



NORTH END OF PINE HILL DAM WITH CORE WALL, CONSTRUCTION JOINT AND EXPANSION JOINT GROOVES IN FOREGROUND. QUARRY AND STONE CRUSHER IN CENTER BACKGROUND

IN THIS ISSUE

JUNE 3, 1922

KOEHRING

Dominant Strength Concrete-the result of Koehring Re-mixing action.

31% variation in strength of concrete!

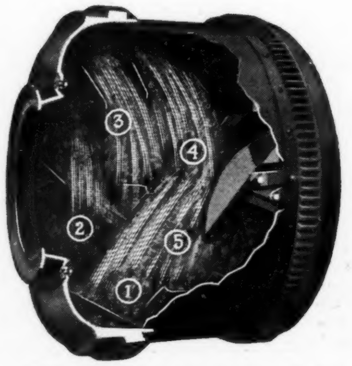
—mixed of *same* aggregate—under same conditions!

Nine mixers, each consistently held its place as to strength of concrete delivered, as determined by compression tests.

Between the strength of Koehring mixed concrete, consistently the highest, and the concrete rating lowest in strength, there was a difference of 31%.

What can explain it, other than the difference in mixing action?

The Koehring five action, remixing principle prevents separation of aggregate according to size—coats every particle of sand, every fragment of stone thoroughly with concrete. Koehring mixed concrete is uniform to the last shovelful of every batch!



THE showering action of the aggregate down from the drum top to the inverted discharge chute, sprays it back to the charging side of the mixer, prevents separation of aggregate according to size and by sending aggregate repeatedly through the mixing action—*Re-mixing*—thoroughly coats aggregate uniformly with cement.

Capacities

Construction Mixers: 10, 14, 21, 28 cu. ft. mixed concrete. Write for catalog C. 14.

Pavers: 7, 10, 14, 21, 32 cu. ft. mixed concrete. Write for catalog P. 14.

Dandie Light Mixer: 4 and 7 cu. ft. mixed concrete; power charging skip, or low charging platform. Light duty hoist. Write for catalog D. 14.

KOEHRING COMPANY
MILWAUKEE WISCONSIN

VOL. 52 NO. 22
Entered as second-class matter at the Post Office, at New York, N. Y., November 22, 1921, under the Act of March 3, 1879.
Published weekly by PUBLIC WORKS JOURNAL CORPORATION, 243 West 39th Street, New York, N. Y
Subscription price $3.00 a year, single copies 10 cents.

PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 52 June 3, 1922 No. 22

Pine Hill Dam

Main Section, Spillway, Bridge and Walls contain 55,000 yards of concrete. Foundations 62 feet deep built in 10 sections with iron stop plates in construction joints. Water cushion formed by weir. Part of main dam built in narrow long sections temporarily serving as cofferdams. Bypass eliminated. Foundations 62 feet deep grouted 30 feet deeper. Crushed stone used for sand.

The Pine Hill Dam, about 1,000 feet long and 113 feet in extreme height above the bottom of the lowest foundation, is now in an advanced state of construction and has been built by day forces of the city of Worcester, Mass.

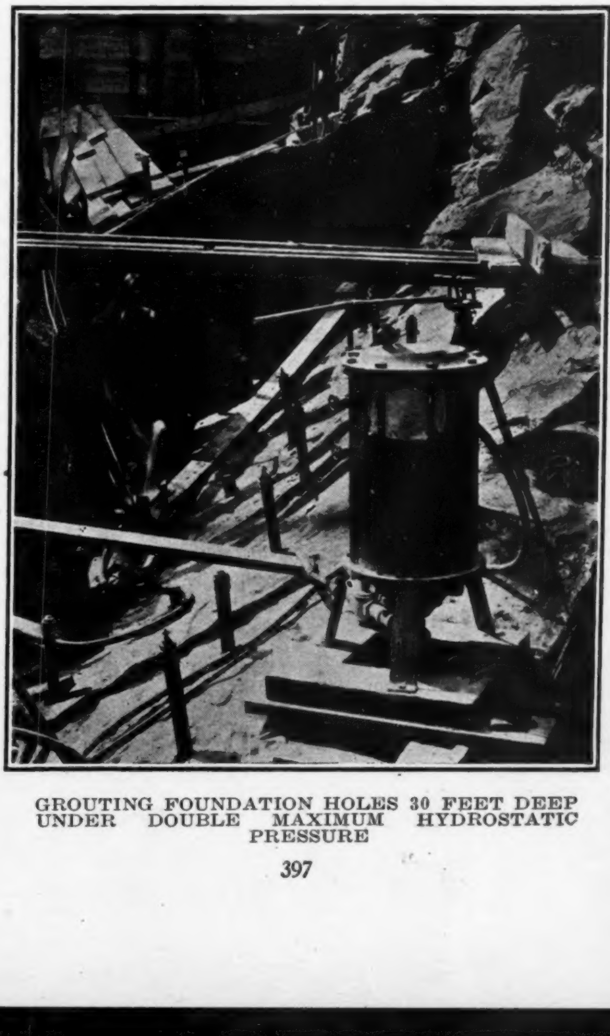
It has cost to the present time about $800,000, while nearly $1,500,000 has been expended on the entire project connected therewith.

It will impound 2,997,000,000 gallons of water in the Pine Hill reservoir constructed on Asnebumskit brook in the towns of Holden, Paxton and Rutland and is located some ten miles from the city.

The 6.90 square miles of area draining into it was originally a part of the watershed of the Nashua river, feeding into the great Wachusett reservoir of the Metropolitan Water Works, but provision for the taking of this area bv the city of Worcester was made by the State Legislature in the act creating the Metropolitan Water Board in 1895.

MAIN SECTION AND SPILLWAY

The dam has a central portion of cyclopean concrete masonry with expansion joints about every 40 feet and is 373 feet long, 80 feet wide in the deepest sections and 17½ feet on top. At each end of this main structure is a buttress from which a concrete core wall continues into the hill on either end. These concrete core walls are reinforced by earth embankments with a total width of 25 feet on top and with slopes of 2 to 1.



GROUTING FOUNDATION HOLES 30 FEET DEEP UNDER DOUBLE MAXIMUM HYDROSTATIC PRESSURE

The up-stream face of the main section is perpendicular, while the down-stream face is on a vertical curve and slope running from the 17½ feet width on top to the width of 80 feet in the maximum section. An 83-foot spillway is provided in the central portion of the dam at an elevation of 10 feet below its top, and across this is a three-arch reinforced concrete bridge.

As the water passes over this spillway it is guided down the face of the dam by walls on either side which lead it into a semi-circular pool having a massive concrete floor and reinforced concrete baffle blocks to break up the velocity of the water as it falls into the 7-foot cushion of water, retained by a weir wall.

CONSTRUCTION JOINTS

The foundation for the concrete portion of the dam in the bed of the valley was carried down to solid rock at a maximum depth of 62 feet below the surface, and this portion of the dam was built in 10 sections

separated by transverse vertical joints providing construction expansion joints. In the spillway fourteen vertical bonding grooves 12 inches wide and 2½ inches deep were provided.

In addition there is a set of vertical longitudinal 12 x ½-inch ingot iron stop plates imbedded 6 inches in one section of the dam and projecting 6 inches into the adjacent section and reaching full height from top to bottom of dam, 5½ feet from the vertical or up-stream face.

About nine feet down stream from this stop plate, in the same transverse vertical plane, there is a full depth 6 x 12-inch drainage well communicating with a horizontal 4 x 6-foot inspection gallery that runs from end to end of the concrete dam at about the same grade and elevation as the original surface of the ground.

The supply from the reservoir is carried through the dam in a 30-inch cast-iron pipe built into the concrete 60 feet below the crest of the spillway. This pipe enters the bottom of the supply well, which is provided with inlet gates at three levels in the up-stream face of the dam. The lower end of the pipe is controlled by a gate installed in a gate house at the ground level just below the toe of the dam.

The dam and its appurtenances are to contain about 55,000 cubic yards of 1:2½:5 concrete and 67,000 cubic yards of earth embankment. It will also require the excavation of 40,000 cubic yards of earth and 11,000 cubic yards of rock; as well as the quarrying of some 75,000 cubic yards of stone from the quarry located nearby.

The site selected for the dam's location presented somewhat difficult conditions. The southerly end was located on a foundation of irregular rock formation which was practically entirely exposed, without any covering of earth. Starting at the foot of this hill, however, and crossing the valley in a northerly direction the strata of rock fell away so rapidly that there was a depth of nearly 62 feet of earth covering the ledge at the northerly buttress, just beyond which point the concrete section was narrowed to a core wall. This wall was continued into the hill, being well bedded in heavy clay hard pan.

EXCAVATION

The rock excavation on the southerly hill had a maximum depth of 45 feet owing to its seamy structure. This depth of excavation ran southerly to a depth of 12 feet and northerly to a depth of 5 feet. These various depths of soft rock were removed by drilling, barring and wedging before reaching a solid foundation. This excavated material was disposed of by guyed derricks to trains on the narrow-gauge railroad, to be taken to the crusher, saved for riprap or disposed of as waste, just as the nature of the material seemed to warrant.

GROUTING

While the rock excavation was thus carried down to what appeared to be a solid foundation, yet the ledge was treated for seams and fissures to a depth of from 25 to 30 feet below the bottom of this excavation.

Three lines of 2-inch holes, averaging about 6 feet apart, were drilled to these depths running the entire length of the main dam and into the southerly hill.

They were parallel to and ranged from 1 to 12 feet from the up-stream face of the dam. These were grouted under a pressure equal to twice that of the water when the reservoir is filled. It is believed that the seams were thus thoroughly sealed and all danger of serious upward pressure on the foundation was eliminated by the use of about 350 barrels of cement required for the grout.

The first excavation made for the dam was to provide an earthern channel to care for the stream at the toe of the northerly hill. With this in operation the foundation for the southerly end of the dam was made and the structure raised to the elevation of the old stream.

CONCRETE FORMS COFFERDAM

Temporary concrete wing walls were then built to connect with the part of the dam finished, and with these as coffer dams the water was turned across the partly completed section.

This effective method saved the building of any flume, and made a channel absolutely water tight so far as any leakage was concerned. This has made the care of the water a simple one during construction and thus little pumping has been required except to care for the surface water.

This section which has been left low during construction can be raised and completed when desired, the 30-inch pipe being sufficient to care for the stream during the dry season.

As the excavation was carried northerly across the valley it was made first in open cuts, with slopes, to a depth of about 20 feet into the earth, beyond which, however, sheeting was used. Parallel trenches each 16 feet wide with 2-inch sheeting were opened up, one on the upper and the other on the toe sides of the dam and were carried down to bed rock. When this excavation was completed and in readiness, concrete was filled in, which then acted as retaining walls to permit the removal of the section left between them.

These walls were immediately raised to a sufficient height so that by the use of guyed derricks it was possible to deposit this earthern core back of them as a part of the embankment.

CONCRETING AND PLANT

The bottom of the rock excavation was left very jagged and irregular, affording a splendid bond with the ledge, and the concrete was laid in subdivisions to break joints so far as possible except where the expansion joints were designed.

The concrete was mixed in plants established at each end of the dam and was delivered to the work by ⅝-yard buckets handled by a trolley hoist on a cableway installed approximately on the center line of the top of the dam. It was also delivered by derricks and placed by either or both as was most convenient.

The plums for the cyclopean concrete were delivered on the service tracks and were placed by three derricks seated on the dam and shifted from time to time as the concreting advanced.

The cyclopean concrete contained about 20 per cent of large stone up to one yard in volume and was placed at a maximum rate of 2,000 yards per month.

CONSTRUCTION OF LOWER PART OF FIRST THREE SECTIONS OF DAM WITH EXPANSION JOINTS BETWEEN THEM

A home-made bag duster built on the general plan of an old time cylindrical carpet duster has added much to the comfort of employees engaged in bundling bags for return shipment to the cement mills. Incidentally it has helped salvage nearly enough cement to pay for its operation as well as having cut the weight of empty bag shipments in half. It has made it possible to return and get credit for nearly 96 per cent of the bags originally received.

The first concrete in this dam was placed in August, 1916, but due to the war and the shortage of help immediately following, but slight progress was made until the summer of 1921.

At the close of that season's operations about 65 per cent of the work was finished and another year ought to see the entire undertaking completed.

The dam was designed and its location determined by former city engineer Frederick A. McClure, under whose direction and supervision the construction was begun and nearly half finished.

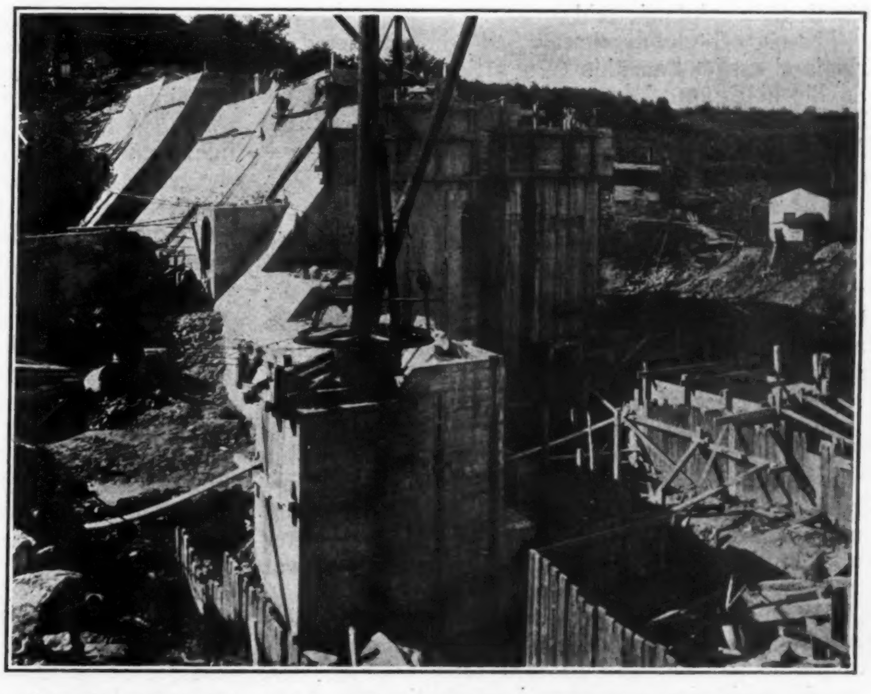
Its construction has been under the joint supervision of the Engineering and Water Departments. George W. Batchelder, the water commissioner, has furnished all materials and supplies, while city engineer David M. Earle directs and supervises the work, assisted by Leon A Goodale, who has served as superintendent since the beginning of the work.

The average force employed was about 215 men and the wages paid in 1921 varied from $4.00 per 8-hour day for common labor to $7.00 for skilled men. The work has been done entirely without the use of teams.

The principal items of plant and equipment included one Lidgerwood cableway, one 10½D Acme stone crusher, four 8-ton locomotives, four hoisting engines, two concrete mixers, one Telsmith intercone mill, two air compressors, two locomotive type boilers for operating stone crusher and cableway, and five derricks.

SAND AND CEMENT

The crushing plant was designed in three units, made necessary by the fact that all sand used in the concrete has been made from stone, due to an absence of sand in this vicinity. The result has been accomplished by crushing and then running the required per cent of broken stone through a Cages Telsmith intercone mill and sand rolls until a product has been obtained superior to standard sand.



DOWN STREAM FACE OF DAM, SHOWING INSPECTION GALLERY AND ENTRANCE TO IT. SHORT PILE COFFER DAMS IN FOREGROUND FOR UP AND DOWN STREAM SECTIONS OF FOUNDATIONS.

Miles Acid Process

Present Status of the process described by the Chief Chemist of the Sanitary District of Chicago. American tests and European plants. Economic and mechanical difficulties. Equipment necessary

Some months ago we described at length the Miles acid process of treating sewage, giving the results of tests that had been made by several investigators. An unprejudiced and clear statement of the present status of this method of treating sewage was presented in a paper before the Engineers' Society of Western Pennsylvania by F. W. Mohlman, chief chemist of the Sanitary District of Chicago. Some of the salient features of Mr. Mohlman's paper are abstracted below.

The patent for this treatment was taken out by G. W. Miles in 1915 and covers a "method of purifying sewage and recovering therefrom normally non-precipitant organic matter, which consists in introducing into the sewage before decomposition of the said organic matter has materially progressed: (1) an inorganic acid as the sole effective reagent. (2) An inorganic acid under conditions which preclude the formation of insoluble soaps. (3) Sulphurous acid. (4) Sulphur dioxide, thereby producing sulphurous acid."

The real step in advance marked by this patent is in the use of sulphur dioxide. Its advantages over sulphuric acid are that it produces an equivalent amount of effective acid at a lower cost; it is a more powerful bactericide than sulphuric acid, and solid brimstone is more portable and less dangerous to handle than sulphuric acid.

The use of sulphur dioxide had been attempted in England earlier than this (See article by Thorndike Saville in Public Works, Volume 50, pages 24 to 26), but whether this would affect the validity of the Miles patent Mr. Mohlman did not attempt to discuss.

THEORY OF THE PROCESS

The theory of the process is described by Mr. Mohlman as follows: "Normal domestic sewage is usually alkaline in reaction, due mainly to the bicarbonates of calcium and magnesium. It also contains a small amount of ammonium carbonate and varying amounts of calcium and magnesium soaps. These soaps have been formed from ordinary soap, which is the sodium salt of stearic, palmitic and oleic acids. Sodium soaps are soluble in distilled water, but when used with water containing calcium and magnesium salts, the sodium salt is changed to calcium and magnesium soaps which are insoluble in water and in organic solvents such as gasoline, solvent naphtha, or petroleum ether."

When an acid is added to sewage, the bicarbonates are first decomposed and then the insoluble soaps are more or less changed to free fatty acids. These would mechanically separate from the liquid and rise to the surface if they were present in concentrated form and the sewage were heated, but, highly diluted in cold sewage, they remain entrained in the settling particles of suspended solids. They are, however, soluble in organic solvents and may be extracted from the dried sludge.

Any mineral acid will effect these changes but sulphuric and sulphurous acids are the only ones economically practicable.

In addition to changing the insoluble to soluble salts, the sulphurous acid effects marked sterilizing actions. Another important advantage is the effect of the acid on colloids. If colloids are electrically charged they resist coagulation, but if the charge can be neutralized they can be coagulated. Colloids in sewage are usually negatively charged and the application of acids will add positively charged hydrogen ions. The principles of hydrogen-ion concentration have not been thoroughly worked out and the proper degree of acidity for securing the iso-electric point which will secure the maximum precipitation of colloids has not been determined.

Sludge obtained by the Miles process is very stable and may be kept for several days in hot weather without becoming septic. It also has a low moisture content, even to having a volume only two-thirds as great as sludge obtained by plain sedimentation.

TESTS AND EXPERIENCES

Mr. Mohlman described experiments made by E. S. Dorr in 1911 to 1914; those of Robert S. Weston in 1915; those by the Sanitary District of Chicago in 1914 and 1915; those by G. J. Requardt in Baltimore in 1915, and those of Professor C. E. A. Winslow in 1917 and 1918; all of which have been previously described in Public Works.

Only these experimental tests have been made in this country, but full size municipal plants have been operated in England and Germany. The best known plant is that at Bradford, Eng., where the grease content of the sewage is very high and the alkalinity very low, thus securing a large return of grease with comparatively low expense for acid. The sewage is treated with sulphuric acid and the resulting sludge, containing 15% to 20% solid matter, is treated with sulphuric acid and heated to the boiling point with live steam and filter pressed while hot and much of the grease thus removed. The filter press cake, however, still contains 15% to 20% grease. This and other plants were described by Thorndike Saville in the article in Public Works referred to above.

At the plant at Cassel, Germany, sludge from plain sedimentation basins was filter-pressed hot and extracted with benzol. This plant was abandoned on account of the excessive cost of drying and the objectionable odor of the grease obtained.

Summarizing all of the foreign work on acid treatment, Mr. Mohlman states that the concensus of opinion has been that the recovery of grease is a profitable undertaking when the sewage contains unusually large amounts of grease, but that with municipal sewages no profits could be hoped for under ordinary conditions. In this country, the Boston results indicated an apparent profit of $6 per million gallons; those at Chicago a substantial margin of profit over operating and fixed charges; those at Baltimore indicated that grease extraction would not be profitable, although it might permit the acid method to compete with other well-known proc-

esses; while the New Haven results indicated no hope of profit from the acid treatment, although the net cost was lower than that of Imhoff tank treatment or screening, followed by chlorination.

ECONOMIC AND MECHANICAL DIFFICULTIES

It will be noticed that all of the American tests were made from 1914 to 1917 or 1918 inclusive. In 1914, garbage grease was sold at about 6 cents a pound, and the price rose until it reached a maximum of 16 cents in 1918. Since then the price has declined rapidly and materially, and is now down to 2½ cents or less. A comparison of the grease obtained by the Miles acid process with that obtained by garbage reduction leads Mr. Mohlman to believe that, where there is any market at all for the former, it would not bring more than one-half to two-thirds as high a price. Conclusions as to the profitableness of the production and sale of grease by this process that are based upon prices of 6 to 16 cents a pound would apparently have very little value when the price has fallen to 2½ cents or less. In fact, Mr. Mohlman believes that at present sewage grease could not be sold at any price, several superintendents of garbage reduction plants finding difficulty in securing any market whatever for their garbage grease a few months ago.

One cause of the low value of sewage grease is the amount of unsaponifiable material in the grease. This was found to be from 15% to 28% in New Haven and 13.6% in Baltimore, whereas in good garbage grease this matter is usually less than 3%.

Inability to dispose of the grease, however, does not mean that the Miles process is unworthy of consideration as a practical method of treatment. "Under certain conditions where clarification and disinfection are required, where the alkalinity is low and where it is essential that no nuisance be produced, the Miles acid process is a worthy competitor of Imhoff tanks followed by chlorination. When economic conditions make it unprofitable to extract the grease, the sewage may be treated with sulphur dioxide, settled in tanks, and the sludge removed and either disposed of in liquid condition or filter pressed. Its low moisture content as taken from the tanks would reduce its bulk to approximately the same as Imhoff sludge, and it might be filter pressed if necessary to bring its moisture content lower." A high degree of disinfection is secured by the process and the effluent is quite clear. In addition, the stable condition of the sludge, the lack of septic action and odor around the plant and the absence of scum are points in favor of this process.

However, where the alkalinity of the sewage is high the cost for acid will be great. It does not produce a stable effluent and the sulphur dioxide uses up dissolved oxygen in the water in which the effluent is diluted. If the sewage contains iron, the acid treatment might tend to keep the iron in solution and possibly even dissolve iron which, upon neutralization with the bicarbonates in the stream, would precipitate and cause unsightly discoloration.

In addition to the doubt thrown upon the American conclusions of commercial value of the process, Mr. Mohlman states that many mechanical difficulties have been overlooked. He mentions seven of these as follows:

(1) Small-scale tests may have produced a sludge with a lower moisture content than can be obtained on a large scale.

(2) Filter pressing may not be as easy as is anticipated.

(3) If the sludge is not pressed but is fed into the driers directly from the tanks at 85% moisture it might ball and cake and not dry properly. Usual practice does not permit of the drying of sludge containing over 80% moisture.

(4) The liberation of sulphur dioxide in the drier may cause trouble.

(5) The sludge may be too compact and sticky for percolation, causing channeling and making it difficult to recover the solvent by "steaming out."

(6) The solvent may carry with it a large amount of colloidal organic matter in addition to the grease. These inert solids might be removed by centrifugal action, but this is not assured.

(7) Distillation of the grease may be almost impossible because of foaming, liberation of sulphur dioxide or excessive carbonization.

EQUIPMENT

Equipment for using the Miles process would comprise sulphur burners, absorption towers and tanks; and in addition to these, presses, driers and extractors if grease and tankage are to be recovered.

Sulphur dioxide could probably be produced more conveniently by burning brimstone rather than pyrites, on account of the freight costs, pyrites containing not over 53% of sulphur while brimstone contains 99%. Moreover, pyrites would produce large piles of cinder consisting of iron oxide.

For burning brimstone the most efficient type of apparatus is a rotating kiln similar to a cement kiln or direct-heat drier. For large plants the ordinary burners 3 feet in diameter and 8 feet long, with a capacity of 250 pounds of sulphur per hour, would probably be used. They are easily regulated and produce a uniform content of SO_2 in the exhaust air. For smaller plants the pan type of burner might be more suitable. This consists of a simple shallow fire pot into which the sulphur is fed from a hearth in front. These may have capacities as low as 100 pounds per 24 hours.

The absorption of SO_2 in the sewage is effected in a tower filled with some kind of porous material, such as pumice, quartz or coke, but preferably a uniform pottery grid. (Mr. Mohlman believes that coke towers would probably lead to trouble or clogging and give poor absorption.) The amount of sewage that would have to be pumped to the tower or passed through it would never need to exceed 5% of the total flow, this amount being then mxed with the general flow of sewage. The portion directy treated should be passed through a fine screen before treatment to prevent the clogging up of the material in the tower.

The raw sewage so treated could then be mixed with the remainder of the sewage in any sort of baffled mixing chamber, as the diffusion of the acid is rapid. From the mixing chamber the treated sewage then flows to settling tanks. Any form of tank should be satisfactory but special precautions must be taken to prevent action upon it by the acid. If it is of concrete, it should be covered with a thick

coat of acid-proof paint or asphalt. The sludge is comparatively inert and there would be practically no formation of gas, and therefore a double-deck settling tank would be unnecessary. However, the sludge should be removed at frequent intervals since the acid eventually is neutralized and the sludge may become septic, possibly in two or three weeks. A uniform removal is advisable and the author believes that Dorr thickeners would be exactly suited to this purpose as they require a negligible amount of power and produce a homogeneous, condensed sludge which may be removed whenever desired. Collection and removal of sludge from sumps is not considered feasible in tanks unless more than 10 feet deep. His experience leads him to feel confident that the moisture content of acid sludge such as that produced at New Haven could be reduced to 85% with Dorr thickeners and the expense would not be greater than that of Imhoff tanks, since the tank can be shallow and a 60 foot thickener can easily be driven by a 10 h.p. motor.

TREATMENT OF THE SLUDGE

Unfortunately no experimental work in the treatment of this sludge has been done on a large scale. If the sludge can be reduced to 85% moisture as taken from the tanks, it would probably be cheaper to dry it directly without filter pressing. If the content cannot be reduced below 90% it will be necessary to press it. As Miles acid sludge dries very quickly on sand beds it could probably be pressed readily, but it is possible that it might be advisable first to press it cold to remove the water and then to steam the presses and remove as much grease as possible in this way. Even if the latter practice were employed, the cake would probably contain 10% to 15% of grease on the dry basis, so that driers would be needed.

For drying, direct-heat driers must be used, as steam drying is too expensive. A drier with a long fire-box must be used and an indirect method of introducing the hot air into the rotating cylinder in order to prevent the sludge from catching fire. Several varieties of direct-indirect driers that now operate successfully on inflammable food products should be satisfactory for sludge drying. There might be trouble from balling or caking, but a way out of this could probably be found.

For extraction, horizontal revolving cylinders are used, having a filtering medium at one end and fitted with both closed and perforated steel coils. The sludge is first flooded with a low boiling gasoline as a solvent and the cylinder is closed and revolved for a short time, at first cold and afterwards heated by the closed coil. The solvent is then drawn off through the filter, taking with it the extracted grease, and more solvent is then added. When extraction has been carried as far as desired, as much of the solvent as possible is vaporized by the closed steam lines and live steam is then admitted and the charge in the tank is steamed out, the steam and solvent are collected and the steam condensed. The solvent is distilled from the grease in a specially designed still. The tankage is moistened by the steaming out and as removed from the extractor contains about 30% moisture, which must be reduced to 10% or less by drying before the tankage can be sold.

Although the grease must be distilled before it can be used for making soap or other purposes, it is preferable to sell it crude to a distiller of fatty acids.

GENERAL CONCLUSION

In conclusion, Mr. Mohlman believes that this process should be at least among those considered in connection with the various sewage disposal problems. Where clarification and disinfection are required, a brief investigation of the alkalinity and composition of the sewage will indicate whether or not it is commercially practicable. If it appears possible that grease extraction may be profitable, large-scale tests should be made to demonstrate the value of the grease recovered.

If it is probable that the grease cannot be extracted and sold at a profit, the acid process may still be compared with the combination of Imhoff tank and chlorination. Where trade wastes interfere with normal Imhoff tank digestion, as was the case at New Haven, acid treatment may be practically the only alternative. It may generally be depended upon to give a better effluent than that produced by an Imhoff tank or a plain sedimentation tank.

Los Angeles Vacation Camps

Probably no branch of the city's recreation work has brought such satisfactory results as has the division of municipal camps. Rather a variation to the prevalent idea of municipal recreation, it has opened a field of activity and advanced rapidly until Los Angeles is receiving, through its recreation department and United States Forestry Department, numerous inquiries relative to this interesting project. This form of municipal service might well be termed the climax. A little daily exercise or recreation is a fine thing, but there comes a time when most of us need an entire change and relaxation from the strenuous life. To meet this need the municipal camps have been established. Last year approximately 4,100 Los Angeles residents spent their Summer vacation at the city's camps.

There are two large camps operated during the Summer from June to October, and one smaller which is conducted as a week-end camp throughout the season. The two larger camps are located in the high mountains in San Bernardino county. Camp Seeley (established in 1914), consisting of twenty-five acres of timbered land, is nestled in Seeley Canyon at an elevation of 4,500 feet on the northern slope of the hills, fifteen miles north of San Bernardino. Camp Radford (established in 1918), comprising eighty-two acres of wooded land, is situated at an elevation of 6,000 feet on the southern slope of the Santa Ana Canyon, thirty miles northeast of Redlands. Both sites are ideal, with running streams, thickly wooded with pines, surrounded by high peaks, and easy of access. This, coupled with comfortable transportation, simple housing, good food and efficient management offers opportunity for the strenuous or quiet vacation, according to the wish of the most demanding vacationist.

The use of these camps is restricted to Los Angeles residents or owners of real estate in Los Angeles. The outings are arranged for periods of

one or two weeks each. Registration is made at the playground office where a special clerk handles all camp inquiries. The cost is adjusted to cover only operative expenses, such as transportation, food, housing, supplies and salaries. A two weeks' vacation last Summer cost from $6.50 to $12.50 for children and $14.25 for adults. This price covers expenses and leaves a small margin to meet depreciation. The buildings are rustic in appearance and of good construction, while the other equipment is very substantial. The outlay amounts to about $25,000 at each camp and includes a large rustic lodge, pow-wow center, about 65 cabins or rooms, kitchens, large dining-room, storage house, toilet buildings and facilities, swimming pool, storage reservoir, water system and modern sewage system.

The life of the camp is the interesting feature. The hikes, the swim, the sports, and the jolly evening camp fires all tend to break down barriers and weld together the several hundred campers, from all walks of life, into one big harmonious family. Many lasting friendships are formed around the big fire.—From annual message of Mayor George E. Tryer.

Use of Tar in Road Construction

From a pamphlet by the U. S. Bureau of Mines describing the various uses to which "tar and its simple crude derivitives" are being put

"The importance of tar as a commercial product has been emphasized during the past five or six years more than ever before." This is the opening sentence of an eighty-page pamphlet just published by the Bureau of Mines of the Department of the Interior, entitled "Preparation and Use of Tar and Its Simple Crude Derivatives." The pamphlet considers the sources, production, properties and distillation, and then the various uses to which it is put, such as timber preserving, fuel, roofing, paint, preservatives, etc. Among the uses is that as a road construction material. The discussion of this use is as follows:

Tars and tar products are fast replacing mineral-oil products for surfacing roads. This fact may be variously ascribed to the increasing supply of suitable tars, the decreasing supply of suitable mineral-oil products, increased appreciation and recognition of the suitability of tars, and the more general availability of tars in practically all parts of the country.

Lunge* reports that in Great Britain in 1907 there were only 100 miles of road covered with tar or tarry mixtures, whereas in 1908 there were 700 miles; in 1909, 3,000 miles; and in 1910, 7,000 miles of such road.

A number of specifications have been drawn up for the tar to be used for this purpose, a fact not at all surprising in view of tars being produced under so many different conditions, and the roadbed, surfacing materials, and traffic and climatic conditions differing widely from place to place. Road tars are used for various purposes, and may be applied in different ways to obtain a particular result—a further cause for the wide variance in specifications. They may be used as a binder in place of cement, as in bituminous macadam roads, for dust-settling purposes or for cementing material—grouting—in the construction of brick, stone, or wood-block pavements. Although the material used for these purposes is usually either a soft pitch or a refined tar, or a mixture of the two, it is quite generally termed "road tar."

A bituminous material such as tar and pitch is used on gravel and crushed-stone roads in several ways: First, it may be forced into the interstices between the stone after it is placed on the road; second, it may be thoroughly mixed with the stone or gravel before the latter is placed on the road (care being taken to avoid using an excess of it); and third, it may be applied to the surface of a finished gravel or broken-stone road with or without a final topping of coarse sand or fine gravel. The pavement produced by the first method cited is called bituminous macadam; that produced by the second method is known as bituminous concrete.

BITUMINOUS MACADAM

On a subgrade, prepared by the usual method of grading, draining and rolling, a base, or bottom course, of broken stone (1 to 3½ inch) is laid; after this has been rolled, a second course of broken stone, usually of somewhat smaller (1 to 1½ inch) size, is laid on top of it. The prepared "road tar" or pitch is forced into the interstices of the top layer, which is then covered with finely cut, one-fourth to three-fourths inch stone to fill all voids. After this surface is properly rolled, a final coat of similar bituminous material is applied, covered with fine gravel or screenings, and rolled. The pitch used for the top coat is softer than for the main binding material. The depth of each course is predetermined according to the kind and amount of traffic the road must bear. The binder is always applied hot—200° to 225° F.—and the amount used per square yard varies between 1¼ and 1¾ gallons, depending on the depth and on the size of stone. In preparing the final surface or "seal coat," one-third to three-fourths gallon of binder is used per square yard of road.

BITUMINOUS CONCRETE

Bituminous concrete pavement is prepared much like concrete pavement, except that the binding material is a bituminous substance instead of Portland cement. A first course of crushed rock is put down as for bituminous macadam; on top of this is laid a layer of mixed crushed rock and sand that has been thoroughly mixed or coated with a bituminous material (pitch). This layer is applied and rolled while hot. The pavement may be left in this condition, but much of it is given a "seal coat" by spreading a layer of the bituminous material (usually thinner and of lower specific gravity than the main binder) over the surface, covering it with fine gravel or coarse sand, and rolling. The size of stone ranges from one-fourth to 1½ inches, according to conditions, but the custom is to use the larger sizes in the thicker pavements. One specification requires a

* Lunge, George, Coal tar and ammonia. London. 1916, 739 pp.

mixture of 1 cubic yard of grit sand less than three-eighths inch and 3 cubic yards of broken stone, three-fourths to 1½ inches. The material must be thoroughly coated, during mixing, with the bituminous binder, and an appreciable excess of binder should be avoided. One specification requires that 18 gallons of it be used per cubic yard of stone, approximating 5 to 7½ per cent. by weight in the finished pavement, but others require 5 to 30 gallons per cubic yard of material treated. This mixing is always done hot at 180° to 300° F. and the mixture is delivered at about 150° F.

SURFACING FOR OLD ROADS

When old roads are repaired, it is often the practice to apply a "blanket" or "seal" coat to the surface after the necessary repairs are made. For this purpose, a heavy refined tar or soft pitch is suitable, and the amount used per square yard ranges from one-half to 1 gallon, according to the thickness of the coat and the condition of the surface to which it is applied.

ROAD PRESERVER AND DUST SETTLER

In the maintenance of roads, it is desirable in many places to apply periodically a thin layer of bituminous material to the surface. For this purpose, refined tar is often suitable. The tar is preferably applied hot, but sometimes is applied cold, in which event it must, of course, be thinner than a soft pitch in order to spread properly. Less than a gallon per square yard is used, and ordinarily but 0.2 gallon.

Such a coat retards the formation of dust. For this purpose, tar is superior to many of the oils that are sometimes recommended and sold as dust preventives. Prof. Agg* says that in oiling roads "there is some danger of introducing into the surface an oil that will act as a lubricant instead of as a binder, and in that event the road will become loose and rapidly develop pot holes and ruts under traffic. Considerable difficulty has been experienced throughout the United States from that source, and too much emphasis cannot be put on the importance of using a good asphaltic base oil or a suitable grade of tar." It is undoubtedly true that tar has less lubricating qualities and contains a greater proportion of bitumens—binding material—and has greater antiseptic and germicidal properties than most mineral oils. Consideration of the foregoing statements will indicate how prominent tar is to be as a road material; moreover, statistics show that the yearly production of coal tar is rapidly increasing, whereas the demand for mineral oils is growing faster than the supply, with prospects of higher prices. Tar is now sold at many works at a lower price per gallon than good mineral oil (road oil).

FACTORS RETARDING THE MORE EXTENSIVE USE OF ROAD TAR

General utilization of tar for road building and surfacing has been retarded by the promiscuous use of any and all grades of tar on all sorts of roads, without regard to climatic conditions or the condition of the road. Obtaining the best results requires the use of judgment Special care should be taken that tar is not applied to wet or frozen roads and that it is hot enough to be of the consistency most suitable for the particular road treated. When tar is spread thickly, under conditions that do not permit ready absorption, it may be spattered on automobiles and other vehicles to such an extent as to cause prejudice against all tar pavements. After crossing such a street afoot, people with white shoes are not apt to have a very kindly feeling toward tar as a road-surfacing material.

The best results are obtained when the road to be treated is dry, free from dust, and warm, and the tar used is water-free and hot.

SPECIFICATIONS FOR ROAD TARS

Specifications for these tars are made with the following intentions:

1. To avoid adulteration or dilution with inferior products.
2. To insure a bitumen content high enough for the purpose.
3. To reduce lubricating properties to a minimum.
4. To provide for the use of tars of the proper consistence only.
5. To avoid the use of tars that will cause rapid deterioration of the road.

As a complete discussion of the merits or defects of the various tars cannot be presented here, only their principal requirements are mentioned.

The specific gravity of a pure crude tar has considerable significance to a chemist and is one of the factors governing purchase; however, as mixing very light oils with pitch will yield a tarry mixture of any intermediate specific gravity, the specific gravity alone is not a reliable test. To prohibit this "cutting back" of pitch with light oils that are volatile and undesirable in a road tar, the loss on heating a sample to a given temperature in a distillation apparatus is limited to a given maximum. The addition of mineral oils is guarded against by stating the specific gravity of the fractions obtained on distillation, or by chemical tests. The specific gravity of high-boiling fractions from the distillation of coal tar is greater than 1.00, whereas the specific gravity of mineral fractions is less than 1.00. To insure a high enough bitumen content, the percentage of distillations residue above a defined temperature and the percentage of free carbon are limited. The lubricating properties are avoided by employing only those tars that do not contain any appreciable amount of paraffin oils, namely, tars of high specific gravity—Coal tars. Specifications also consider the fluidity (viscosity) of the tar at a given temperature and require that the tar be applied at the most suitable temperature.

Much has been said regarding the free carbon and the naphthalene content of road tars. Some difference of opinion exists as to the maximum amounts permissible and as to the minimum amount of free carbon that will be tolerated It is generally agreed that a great excess of either naphthalene or carbon is detrimental, and should not be allowed. Tars with very small content of free carbon are frequently inferior to those with a moderate content. The upper limit sometimes set for the free carbon content of tars used as binder is 25 per cent. and the lower limit is frequently 12 per cent.

* Agg, T. R. The construction of roads and pavements. New York. 1916, 432 pp.

For hot surfacing the limits are 22 and 10 per cent. (Here are given the specifications of the American Society for Municipal Improvements.)

REQUISITES FOR ROAD-DUST SETTLERS

The very light tars are most suitable for road-dust settlers. The free carbon should be very low, the lower the better, usually, and water and naphtha should be removed. Water-gas tars are good for this purpose As the surface on which the tar is to be applied must be considered, it is evident that specifications might require anything from a crude to a highly refined or specially prepared tar.

Frequent changes in specifications have resulted from the experiments that are being carried on continually with various tar preparations. Specifications for such materials that have been used with success have been published by the U. S. Department or Agriculture.* These are not represented as "standard" but as "typical" specifications. In general a tar from which the fraction boiling below 150° to 170° C. has been distilled off makes a suitable material for a primer or surface coat on macadam, gravel, or shell roads, especially if the tar contains a rather low percentage of free carbon High-boiling fractions are sometimes added to increase the fluidity of the product and decrease its content of free carbon. Methods of "meeting" specifications are mentioned in a later section of this paper.

When surface coats and dust preventives are applied care should always be taken to see that the road is dry and free from accumulations of dust and dirt. It is best to sweep the road clean before treating it.

* Hubbard, Prévost, and Reeve, C.S., Typical specifications for bituminous road materials: Bull. 691, U. S. Dept. of Agriculture, 1918, 60 pp.

American Water Works Convention*

Continuation of account of the meetings of the American Water Works Association held in Philadelphia last month

On Wednesday evening J. W. Ledoux read a quite exhaustive paper on wood pipe, giving the formulas for calculating strength of pipe and of bands, data concerning age, etc.; his general conclusion being that, even allowing wood pipe only one-quarter the age of cast iron, its use would be cheaper in the long run under those conditions that were favorable to it. An abstract of this paper will be published by PUBLIC WORKS in a few weeks. In discussing this J. N. Chester said that it was necessary to use no sap wood and in fact the precautions necessary in using wood pipe were so numerous and vital that in general he would say not to use it at all in a distribution system or in a pumping main. He named three cities which, although they had considerable wood pipe, required it to be taken up whenever a street was to be paved.

*Continued from page 381.

J. E. Gibson of Charleston, S. C., showed some samples of pipe which they have just begun making in which the cast iron pipe is lined with natural cement to a thickness of 3/16 inch to 1/4 inch in order to prevent tuberculation; the lining being applied in the manner that has been used for years in making cement-lined service pipe in Massachusetts, using a metal cylinder with a cone-shaped front end, which is drawn through the pipe and compresses the cement against the walls. He stated that in tapping these mains, the cement was pushed off in a cone-shaped opening, but did not uncover the iron around the hole.

The report of the Committee on Standard Specifications for Cast Iron Pipe and Specials was presented by the chairman, F. A. Barbour. He said that the manufacturers deserve great commendation for the willingness with which they co-operated with the engineering committees of this society and the New England Water Works Association. There was little that was new to report on the subject, but he stated that the matter of coating for cast iron pipe was in a far from satisfactory condition. Although specifications called for coal tar pitch varnish, the material used is generally neither pitch nor varnish but is usually coal or water gas tar from which some of the desirable constituents have been withdrawn or are absent, and this is frequently heated too high by the pipe, giving a brittle coating, this being especially the case with large pipes which retain their high temperature for a considerable time.

C. E. Inman read a paper giving "Experiences with Cast Iron Water Pipe for Pressures Higher than Allowed by Current Specifications," giving several illustrations of the use of Class A pipe where the pressures were those calling for Class B or even Class C, this being especially the case with 6-inch pipe. In discussing this a number of the older members stated that they had for years laid and still lay Class A 6-inch pipe for pressures over 100 pounds. Mr. Chester cited instances of some 6-inch Class B pipe under 300 pounds pressure, and none under this or any of the lower pressures had given any more trouble than any other pipes in the system. William F. Wilcox stated that he had had similar experiences with Class B 6-inch pipe in Birmingham and vicinity.

The method of making centrifugally cast iron pipe was discussed by Peter Gillespie, with illustrations with motion pictures and lantern slides. As has previously been told in PUBLIC WORKS, this pipe has been used for several years in Canada. The United States Cast Iron Pipe and Foundry Co. have the patent rights for this country and have begun manufacturing it, although they are not yet quite ready to furnish it for the market. A sample of pipe manufactured by them and sawed in two was shown in the exhibit hall. It was stated that, although the pipe weighed a little more than half as much as the ordinary cast iron pipe for the same pressure, it was fully as strong if not stronger, also the cost would be about the same per foot owing to the more expensive manufacture. There would, however, be a saving in freight and in handling by the contractor or city.

Two additional features of the evening session not on the program were a paper by Leonard Metcalf and a brief talk by E. J. Mehren. Mr. Mehren

spoke on the American Construction Counsel, an organization in which it is proposed to unite all of the agencies concerned in construction work, including architects, engineers, contractors, materialmen, municipal, state and federal officials, etc., and an invitation was extended to the American Water Works Association to become a charter member. The dues it was proposed to make $100 a year for each organization. The matter was left to the decision of the executive committee, but the members present voted that it was the sense of the convention that it would be desirable to join the council.

Mr. Metcalf read a paper giving further data concerning the cost of operating water works and the incomes of water works during the past two years, supplementing similar data given by him two years ago. This paper was published in last week's issue.

THURSDAY SESSIONS

Thursday was Superintendents' Day and was perhaps the most successful superintendents' day which the society has yet held, the sessions not being interfered with by matters not directly connected with discussion of operating matters and the discussion being quite general and well continued.

L. N. Enslow described the method of controlling the application of chlorine to water supplies in Virginia, with a practical demonstration of the operation, using orthotoledin as a reagent in carrying out the excess method. The general method was to apply 0.2 part per million excess chlorine, over and above that shown by the test to be absorbed, to secure the bacterial effect. This was followed by considerable discussion by superintendents, chiefly in the form of questions. One member stated that he did not believe that the ordinary water works superintendent was competent to apply the test, but in answer to this several engineers whose experience covered a large number of plants stated that as a matter of fact superintendents did use the test successfully and without difficulty.

G. Gale Dixon, chairman of the Committee on Physical Standards for Distribution Systems, presented the report of the committee, one of the chief features of which was the recommendation of a terminology. He stated that considerable improvement was needed in the knowledge and application of hydraulics and economic design of distribution systems, the knowledge of which appeared to be quite hazy. Some of the terms recommended were: Supply mains and distribution mains, the latter being divided into primary feeders, secondary feeders and distributors. (Incidentally Mr. Hazen suggested the use of reticulators instead of distributors, the former being the English term.) Some of the questions that Mr. Dixon considered to need investigation and which their committee hoped to investigate were as follows: The laws of head in primary feeders; practical limit in size of cast iron pipe before beginning the use of steel pipe; the maximum size of pipe that should be tapped for house connections; the maximum size of private fire connections that should be permitted; the satisfactoriness or otherwise of lead substitutes for joints; methods of making bridge crossings; methods of laying mains under railroad tracks; testing the joints of pipes before backfilling; the use of valves smaller than the mains; use of extension stems on valves; advisability of keeping large valves partly closed; whether the street corner is the best location for fire hydrants; advisability of using check valves between zones in a distributing system; the use of air valves, relief valves and pressure reducing valves; the loss of capacity of mains with age; the minimum working pressures for distribution systems. In the matter of the use of valves smaller than the mains it was suggested that this would interfere with cleaning mains later on. It was stated that New York City has adopted this practice and uses only four sizes of valves in its distribution system.

The use of air and relief valves was discussed by M. N. Borden, who described at some length the disadvantages of allowing air to collect in mains and the probability of its doing so under certain conditions. He stated that under 150 pounds pressure air would leak through lead joints that were tight to water. Air is apt to leave the water as pressure falls and to collect near summits in the pipe. It is also found especially abundant a short distance beyond where it leaves pumps. Air valves are therefore desirable near pumping plants and at all summits. Relief valves are desirable where there are sudden or undesirable pressures coming upon the mains; for instance on a main feeding a locomotive crane or other appliance likely to produce water hammer. In the former case he recommended a surge tank. He also referred to the desirability of relief valves on domestic services where check valves are applied next to the meter.

Dr. W. P. Mason gave a talk on the value of a sanitary survey which he described as being as necessary to prescribing for a water system as a personal examination of a patient was desirable for a physician. He cited one instance where samples sent from a set of wells 125 feet deep were reported as containing B-coli at times, which might have led to the condemnation of the supply. A personal inspection, however, showed that the soil was sandy and there were no houses near enough to endanger the supply and apparently no opportunity for pollution. In view of these facts and of the fact that B-coli has been found where no human pollution was possible and that the tests of the samples had been made in hot weather, the samples not having been on ice; he believes the condemnation of the supply would have been entirely unjustified, and yet would have been ordered but for the sanitary survey.

In discussing the "Causes of Failure of Cast Iron Pipe," F. A. McInnes stated that the most common cause in Boston was undoubtedly a rigid bearing, such as the pipe resting on a rock, but especially, in Boston at least, on other structures which had been built underneath the mains and in contact with them, the disturbed soil nearby under the main having settled and thus required the main to act as a beam. In addition, he believed that the quality of the iron was not sufficiently protected. Of 2,100 test bars broken, 40 per cent of these showed less than .3 of an inch deflection, the range being from .22 inches to .37 inches. Sulphur also he considered to be an important consideration. Samples of iron from broken pipes, of which he gave quite a long list, showed from .133 to .23 parts of sulphur.

(To be continued)

PUBLIC WORKS

Published Weekly
at 243 W. 39th St., New York, N. Y.

S. W. HUME, President J. T. MORRIS, Treasurer

Subscription Rates
United States and Possessions, Mexico and Cuba $3.00 year
All other countries.............................. 4.00 year

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Telephone (New York): Bryant 9591
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Supervision of Sewage Treatment Plants

"The sewage treatment plants that I have come into contact with are in nearly 100 per cent. of the cases neglected, unsupervised and unnoticed. Usually there is no one whose duty it is to operate the plants and they are supposed to be self-operating by the town officials. This is often due, I believe, to the impression left by the constructing engineer that no attention is needed."

This statement was made to the writer recently by the sanitary engineer of the state board of health of a southern state. Unfortunately the condition described is by no means confined to that state. A few weeks ago we quoted the state sanitary engineer of an upper Mississippi Valley state as saying that the best that could be said for most of the plants in his state was that they "did the sewage no harm."

Criticism of this too common state of affairs is not new—we have made similar comments before—and we propose to continue making them and citing examples that illustrate this most objectionable condition so long as legislators fail to provide some remedy by giving to state health boards or other competent state or federal bodies power to compel the proper operation of each plant and the securing thereby of at least an approximation to the amelioration of conditions which was the aim of such plants.

The American Construction Council

The purpose of this organization is " to place the construction industry on a high plane of integrity and efficiency." A short creed, but one that covers the whole field and, fully consummated, means little less than universal peace and prosperity.

It visions industry, economy, honesty and wise investment everywhere; fairness and co-operation between employer and employee; and steady occupation with fair reward for both labor and capital.

It means safety from profiteering, broken contracts, extortion and conspiracy, and unbalanced remuneration, that have infected the world and wasted its resources, and when this has been effected or even notably advanced it will compel corresponding conditions in general industries, production, commerce and finance.

The tasks of organization and, much more difficult, of execution, will be slow and costly. They must be voluntary, earnest and persistent; they must be inspired by broad altruism and supported by a certain amount of material resources and then they must be vigorously and practically endorsed by every honest man, as they will surely be opposed by the selfish, dishonest and lazy ones who create, agitate and inflame dissensions to serve their own greed.

The council will be representative of the widest interests involved, including engineers, manufacturers, dealers, labor, financiers, public officials, great enterprises and government departments. It will take up ethics, researches, statistics, standardization, elimination of waste, steady employment, apprenticeship and other vital factors of construction.

The organization of the council is to take place on June 19th and 20th, and an invitation to it is published on page 408. Further reference to the council will be found on page 406.

Road Building and Malaria

The task of eradicating malaria has been made more difficult by the fact that railway and highway construction is continually creating new pools that serve as breeding spots. Assistant Surgeon General Carter found that probably three-quarters of the malaria in one district in eastern Virginia came from such artificial pools. It is hoped to avoid anything of this kind in construction of highways under Federal aid, the specifications requiring that the culverts on federal aid roads be so placed that they will completely drain all wet areas above the culvert entrance and that all borrow pits or excavations made along the roadways be filled or properly drained. Many southern states have enacted laws of similar purpose.

If attention be paid to this matter when roads are being built, adequate drainage can be had then with very little if any additional cost, whereas if culverts are placed too high or borrow pits are not properly drained, the expense for later rectification may be very great. The state highway engineer of Alabama recently appealed strongly to all engineers and other officials to co-operate in this matter and every community, especially in the south, should take particular interest in the subject, avoiding creating such spots themselves and reporting the whereabouts of any that are being created in their vicinity.

Invitation to First Meeting of Construction Council

The following is called to the attention of readers of *Public Works* at the request of General Marshall:

Lacking facilities at present for direct communication with the thousands of important men in the construction industry, the temporary directing committee of the American Construction Council begs leave through the columns of the engineering, architectural and construction press to extend a personal invitation to each member of the industry to attend the organizing meeting in Washington, D. C., June 19 and 20.

The step contemplated, that of bringing together for cooperation in behalf of the industry and of the public all the elements of construction activity—engineers, architects, labor, the contractors, the manufacturers and dealers, and the financial interests—is epochal in American industry. It deserves, and promises to have, the full support of the entire industry. A full representation at the organizing meeting will be the best testimony to the country of the solidarity of construction interests in the new movement.

Full details of the plan are set forth in a comprehensive pamphlet, procurable from the temporary office, 1053 Munsey Building, Washington, D. C. The meeting will be held in the Washington Hotel. Mr. Hoover will preside.

Temporary Directing Committee, American Construction Council
R. C. Marshall, Jr.

Dynamiting an 80-Foot Brick Stack

A brick smoke stack about 80 feet high was built some time ago at Glen Gardner, New Jersey, and having become dilapidated, was in a precarious condition endangering adjacent structures on which it might fall if blown down by a high wind.

The lowest bid received for tearing it down was $1,100 and some contractors invited to bid refused on account of the dangerous nature of the work. Under the direction of C. E. Weaver, Erie, Pa., of the DuPont Co., it was easily and safely razed by dynamite.

Holes 1 3/8 inches in diameter and 12 inches long were drilled horizontally in the base of the stack, five holes on each of three adjacent sides. In order to avoid shaking the stack too violently, the blasting was done progressively with successive rounds as indicated in the accompanying diagram. The holes were each loaded with a half stick of 30 per cent. Red Cross Extra dynamite, of which six pounds were required, which, with the blasting caps, cost less than $3.00. All of the shots were fired by electricity.

LOCATING HOLES FOR DYNAMITE CHARGES FIRED IN THREE SHOTS

The first and second rounds were fired on the side towards which the chimney was required to fall and weakened it without overthrowing or splitting the stack. After the second round had been fired a two-pound mudcap charge was placed in the center of the weakened side and, together with the remaining holes, was fired without smashing the stack which, remaining still intact, first began to lean in the required direction and finally gathered momentum and fell to the predetermined point in the open field without damaging any other structure. No compensation for his services was accepted by the DuPont technical representative.

How to Handle Concrete Piles 80 Feet Long

Hooks provided in the sides of pile to engage slots in a steel carrying truss that has two alternate connections to hoist and permits horizontal, vertical or inclined position of pile without developing injurious stresses.

Editor PUBLIC WORKS, Sir:

We are taking advantage of your offer in a recent number of PUBLIC WORKS to avail ourselves of your assistance in our construction problems.

We are enclosing a blue print of a hollow pre-cast concrete pile which is to be used in the construction of a bridge. Our problem will be the handling of these piles after they have been pre-cast and seasoned to the location of the pile driver and then getting them into the leads without injuring the pile. The piles will require to be seasoned for thirty days after pouring. We expect to pour these piles horizontally, using wooden forms and a 28-inch gauge metal core, leaving the core in the pile. At the bottom end of the pile we will leave in a 2-inch piece of galvanized pipe for the purpose of jetting. As the majority of the material that the pile is to pass through is vegetable muck we do not anticipate any trouble in jetting down that far and for the remaining 10 feet, think that a few blows with the hammer assisted by the water pressure will carry the pile down to the necessary depth.

We would appreciate having your ideas, however, as to the best method of lifting these piles into the leads and how it is best to arrange our slings so as to have the minimum amount of breakage.

———— Company.

The plans submitted show that there are required for the job 358 piles of an average length of 80 feet and a uniform octagonal cross-section inscribed in a 20-inch square and having walls with a minimum thickness of 4 inches. The lower end of the pile is tapered in 2 feet to a thickness of 6 inches and, except for the jet pipe, is solid for a distance of 18 inches from the point. The pile is reinforced by eight 1-inch steel bars parallel to the axis that runs the full length from the top of the pile to the commencement of the taper, beyond which four of them are cut off and four are bent and continued to the point. The bars are wired to a spiral coil of 1/4-inch rods, wound to a pitch of three inches for 4 or 5 feet at top and bottom and to a pitch of 6 inches intermediately.

The piles are driven in seventeen transverse bents and in four tiers, and are vertical except a few at the ends of the bents which are battered. They all are driven through a thick bed of muck to penetration in coarse gravel which in some cases is overlaid with fine sand up to 20 feet deep. The penetration in the gravel varies from a few inches to about 15 feet maximum.

Owing to the thickness and weight of these units,

and their comparatively narrow width, careless and improper handling would be likely to develop very heavy stresses that would break or crack the concrete. This can easily be prevented by giving them proper support and carefully avoiding impact.

As there is a large number of piles, it will probably be necessary to move them from the casting floor to storage and leave them there for some time, during the period of seasoning. Although it would be possible to handle them safely when only a few days old, by means of locomotive cranes, derricks or their equivalent, it would be more simple and safe to move them from the casting floor to the seasoning skids without lifting. This operation will be facilitated if the bottoms of the forms are made detachable and the piles allowed to remain on them while seasoning.

If the piles are cast in a single tier, a number of parallel horizontal or slightly inclined rails can be set under the forms and the piles safely pushed over them to position in storage without removing them from the bottom pieces of the forms.

If it is desirable to remove the bottoms of the forms when the piles are only a few days old, the latter may be rolled 45 degrees to take bearing on long planks or short cushion pieces supported on rails or pairs of rails not more than 10 feet apart and transverse to the axis of the pile; after which the pile can be skidded on the cushions of planks to the required position or transferred to carefully prepared bearings on trucks or on cars transferring them to the storage yard where they may be skidded off.

If it is permissible for these piles to remain a week or ten days on the casting floor, they may at the end of that time be safely handled without skidding by use of a locomotive crane, derrick or traveler. In this case it will be necessary to provide rigid support for the piles at several intermediate points to prevent undue flexure when the axis of the pile is in a horizontal or inclined position. This can be secured by various combinations of slings, bridles, evening bars, trusses, cradles, or possibly by an interior mandrel, but the latter would, on account of its small diameter, necessarily be so heavy that it would not be very convenient or advantageous.

Piles up to 40 feet long with the reinforcement that these have, could, however, be handled by a mandrel or by simple slings or bridles arranged to give them support at about the quarter points, and allowed to turn freely from horizontal to vertical position in the hoisting tackle.

This would not be satisfactory for the maximum lengths of piles and as these can be handled by a simple rigid device, the latter may as well be made suitable for lifting shorter lengths as well, and thus use a uniform method throughout. It is important that in horizontal position the piles should be supported without excessive overhang at either end and without long spans between points of support, and that the supports should be positive, uniform, with little clearance, easily attached and disengaged, that they should provide abundant rigidity and should always be attached to the piles at exactly the same places and in the same manner.

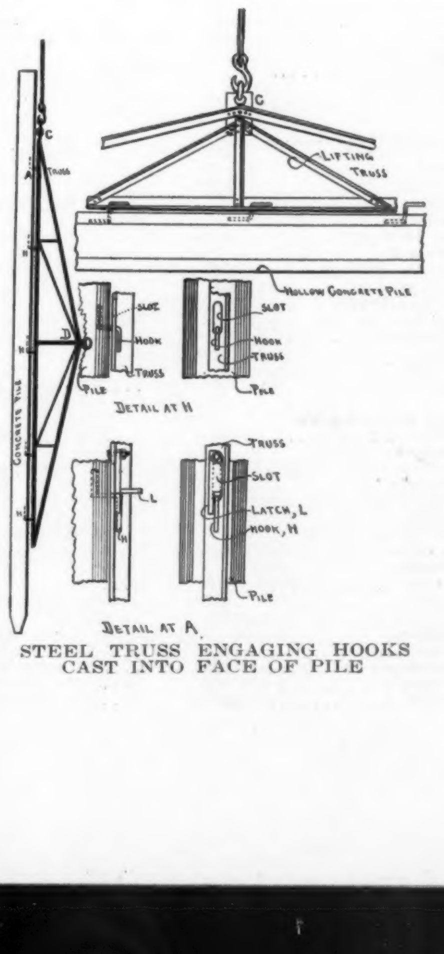
To accomplish this, a simple method is to cast in the upper surface of the pile, several short rods bent to a Z-shape, one end projecting a fraction of an inch clear of the outer face and parallel to the axis of the pile or slightly divergent from it, thus forming a series of parallel hooks, marked H, H, H, spaced exactly the same distance apart on all piles, varying the length of the overhang or the number of hooks for different pile lengths.

A light steel truss, conveniently made of single angles riveted together, should be designed 10 or 20 feet shorter than the longest pile and provided with an attachment C for hoisting tackle at one end and an attachment D for hoisting tackle at the center of the top chord. The outstanding flange of the lower chord should be slotted to correspond with the faces of the hooks embedded in the concrete pile so that when the lower chord of the truss is parallel to the axis of the pile, the outstanding legs of the hooks will register with the slots in the truss and pass through them, after which the short longitudinal displacement of the truss will give the stems of the hooks bearing against the ends of the slots and the truss can be locked in position by means of the pivoted latch L at the end of the truss at A which can be revolved by its projecting bent end and will prevent any displacement of the truss relative to the pile.

If there is a clearance of more than 1/4-inch between the hooks and the truss lower chord angle which they engage, it should be filled by wedges driven to bring all the hooks to uniform solid bearing. If the hooks fit accurately and uniformly a slight clearance will not be injurious.

The pile can then be lifted to a horizontal position by any convenient hoisting tackle connected to the center of the top chord at C or by a bridle rope attached to the hoisting line, the ends of the bridle being attached to the connections at C and D, thus enabling the bridle to render freely through a sheave in its bight that supports it and permits the pile to be revolved in the bridle to any required position.

The piles can thus be hoisted or lowered in a vertical position or lowered in a horizontal position for



STEEL TRUSS ENGAGING HOOKS CAST INTO FACE OF PILE

storage or transportation, and when the hoist-line is slacked and the latch disengaged, the truss can be displaced longitudinally far enough to make the projecting hooks register the full length of the slots and the truss can be lifted off and removed quickly and safely.

To place the piles in the leads of the pile driver, the truss should then be again engaged with the pile hooks, locked into position and lifted either with the bridle or with two lines attached to points C and D and line D operated while line C is overhauled until the pile assumes a vertical position and is swung to place and lowered to bottom, when the trus can easily be removed and used for handling another pile and so on.

The section modulus of the piles should be calculated, the moment of flexure computed for the support of the piles at different points and the hooks should be placed close enough to keep the maximum stresses down to say 500 pounds per square inch in compression, and the tensile stress in the reinforcement rods in the pile down to 8,000 or 10,000 pounds per square inch. The maximum distance between hooks will thus be found and some uniform smaller spacing and corresponding number of hooks selected to secure uniform arrangement for all lengths of piles so that the one truss will fit all cases.

There have been several instances of very long concrete piles, notably those driven in San Francisco Harbor and those driven by the MacArthur-Perks Company in Havana and those driven in other places, some of which have been reinforced to resist bending moments due to their dead weight in any position; others have been handled by carefully restricted attachments made with eyes or loops cast in the concrete at regular positions in the side of the piles, insuring the attachments of lines or tackles at fixed points so that only the predetermined stresses should be developed.

Although this method has been successfully used for rapid work and for positive elimination of heavy and uncertain stresses, the same results can be secured by the use of a truss which for a large number of piles involves only a very trifling cost for each pile and will permit the work to be done more rapidly and conveniently.

Methods of Paying for Paving

How much assesed on abutting property and how much paid by city; methods of calculating assessments; how funds are obtained
Supplementing tables published in the May 13th issue

Name of City	Percentage of paving cost: Assessed on abutting property	Percentage of paving cost: Paid by city	Methods of calculating assessments	Payable in how many installments	Funds obtained by city by	Life of bonds, years
Alabama						
Bessemer	....	⅓	By front foot	10	bonds	10
Fairfield	all	none	By front foot	10	....	10
Arizona						
Bisbee	....	all	....	....	bonds	20 yr. serials
Clifton	....	all	....	....	budget & bonds	20
Prescott	all	....	1920 front ft., 1922 area	10	budget	10
Yuma	all	....	Frontage, incl. intersections	10	....	....
Arkansas						
Paragould	....	none	Dist. pays as assessed benefits	15	....	15
California						
Alhambra	all	....	Front foot	Paid on completion of work	budget	10
Bakersfield	all	....	....	....	....	....
Chico	all	....	Front., intersect. in prop. to areas	15	both	15
Modesto	all	....	Front foot and area	14	bonds	30-40
Monrovia	all	....	Front foot	10	budget for rep.	....
Oroville	....	....	On front., intersections prorated	....	bonds	10
Richmond	all	none	Acc. to benefits	6-10	budget for rep.	....
Santa Monica	all	....	Front ft., acc. to benefits	10	....	10
Colorado						
Colorado Springs	50%	....	Zone system	14	bonds	12 yr. serial
Montrose	all	....	Front foot	15	....	10-15
Connecticut						
Ansonia	....	all	....	....	budget	....
Bridgeport	½	....	Front foot	1	bonds	5
Derby	none	....	....	....	budget	....
New Canaan	....	....	....	2	special tax	....
Stamford	½	....	½ on all but tar mac., by front foot, excl. intersections	....	both	20 yr. serial
Dist. of Columbia						
Washington	½	....	Front ft., excl. intersections	3	budget	....
Florida						
Jacksonville	⅔	⅓	Front ft., incl. intersections	....	bond	10-30
Georgia						
Brunswick	....	⅓	Front foot	3	budget	....
Idaho						
Idaho Falls	....	....	By area of lot, intersect'ns by city	20	bonds	20
Pocatello	all	....	Front ft., excl. intersections	10	bonds	10-20
Illinois						
Chicago	all	....	Frontage	5	....	....
Freeport	all	....	Front ft., excl. intersections	10	bonds	10
Oak Park	all	....	Front foot	5-10	budget	....
Indiana						
Bicknell	all	....	Front ft., excl. intersections	10	both	10
Logansport	all	....	Area of lots excl. intersections	10	both	10-20
Newcastle	all	....	Front ft., excl. intersections	10	budget	....
Wabash	all	....	Front ft., excl. intersections	10	budget & war.	....

Table No. 3—Methods for Paying for Paving—(Continued)

Name of City	Percentage of paving cost: Assessed on abutting property	Paid by city	Methods of calculating assessments	Payable in how many installments	Funds obtained by city by	Life of bonds, years
Iowa						
Creston	all	....	Area and benefits	10	bonds	1-10
Denison	all	....	Area	7	....	....
Le Mars	all	....	Area, incl. intersections	10	....	....
Waverly	all	....	Front foot	10	budget	....
Kansas						
Independence	....	....	Assessed value of ground in district, city pays intersections	10	bonds	10
Manhattan	all	....	Front ft., excl. intersections	10	bonds	10
Kentucky						
Frankfort	⅔	⅓	Front ft., excl. intersections	10	budget	....
Ludlow	all	....	Front ft., excl. intersections	1	budget	....
Madisonville	all	....	Front ft., excl. intersections	10	budget	....
Paducah	all	....	Front ft., excl. intersections	10	bonds	10
Shepherdsville	....	all	....	....	....	....
Louisiana						
New Orleans	....	all	Foot frontage	10	budget	10
South Highlands	all	....	Front foot	4	....	....
Maine						
Lewiston	....	all	....	....	....	....
Rockland	....	all	....	....	budget	....
South Portland	....	all	½ for cement walks	....	budget	....
Maryland						
Baltimore	1/6	5/6	By front foot	10	loans	....
Easton	½	½	By front foot	when complete	both	....
Hagerstown	....	all	....	....	budget	....
Massachusetts						
Boston	½	½	Area of lot	10	loans & taxes	20
Brookline	none	....	....	....	budget	....
Danvers	....	all	....	....	both	5
Gardner	....	all	....	....	bonds	10-20
Greenfield	....	all	....	....	bonds	4
Lee	....	all	....	....	both	1-3
Malden	....	all	....	....	bonds	....
New Bedford	....	all	....	....	bonds	life of impv.
Newton	all	....	Front foot	10	bonds	10
Peabody	....	all	....	....	both	10
Reading	....	all	....	....	budget	....
Revere	....	all	....	....	bonds	10
Taunton	....	....	....	....	bonds	5-10
Waltham	½	½	Front foot	10	bonds	5-10
Watertown	....	all	New sts. by abutter by front ft.	1-10	both	....
Worcester	....	all	....	....	budget	....
Michigan						
Flint	all	....	Front ft., area, excl. intersects.	5	bonds	10
Kalamazoo	all	....	Benefit	10	budget	....
Menominee	....	½	Front ft., excl. intersections	5	both	....
Munising	⅔	⅓	Front ft., excl. intersections	1	budget	....
Muskegon	all	....	Front ft., excl. intersections	10	budget	10
Port Huron	all	....	Front ft., excl. intersections	12	bonds	....
Saginaw	....	30%	Front ft. area, etc., excl. intersec.	10	both	10
Minnesota						
Duluth	all	....	Front ft. area, etc., excl. intersec.	5	both	....
Fairmont	all	....	Front foot	15	....	1-15
Farmington	all	....	Front ft., excl. intersections	....	....	....
Luverne	all	....	Benefits	up to 20	....	10-20
Minneapolis	....	⅓	Front foot	10-20	bonds	10-20
Virginia	40%	60%	Front ft., excl. intersections	5	budget	....
Mississippi						
McComb	all	....	Except intersections	10	bonds	10
Vicksburg	⅔	⅓	Front ft., intersections by city	10	both	....
Missouri						
Cape Girardeau	all	....	Front foot, area	5	....	....
Monett	75%	....	Front foot	5	budget	....
Montana						
Billings	all	....	Area of lots	12-20	....	....
New Jersey						
Camden	⅔	⅓	Frontage, intersections by city	10	both	serial
Roselle Park	50%	50%	Frontage, excl. intersections	10	bonds	10
Rutherford	⅔	⅓	Frontage, excl. intersections	5	notes	life of impv.
South Orange	⅔	⅓	Frontage, excl. intersections	10	bonds	10-20
Westfield	67%	33%	....	10	bonds	10-20
West New York	....	25-35%	Front foot	10	bonds	15
New Mexico						
Clovis	all	....	Front ft., incl. intersections	10	....	9
Santa Fe	all	....	Front foot	10	....	10
New York						
Amsterdam	50%	50%	Front ft.—30% area of intersections charged to No. lin. ft. on st.	3	budget	....
Auburn	50%	50%	Front footage	10	Bonds	10
Carthage	½	½	Front foot	1	Bonds	20
Endicott	25%	75%	Front foot	2	Bonds	1-20
Jamestown	all	....	Front ft., excl. intersections	10	Bonds	10
Johnson City	50%	50%	Front foot	3	Bonds	5-15
Malone	....	all	....	....	budget	....
New York City						
Bronx	all	....	Repav. by city. Front foot	10	Bonds	....
Brooklyn	....	....	Percentage assessed determined by Bd. Est. & Apportionment	10	Bonds	5-50
Manhattan	all	....	Front ft. Repav. by gen. tax levy	10	both	10
Queens	all	....	By lot ft.	10	both	....
Richmond	all	....	Area of lot	10	Bonds	10

Table No. 3—Methods for Paying for Paving—(Continued)

Name of City	Percentage of paving cost: Assessed on abutting property	Paid by city	Methods of Calculating assessments	Payable in how many installments	Funds obtained by city by	Life of bonds, years
New York (Continued)						
Norwich	⅓	....	Front foot	5	Bonds	20 yr. serial
Saranac Lake	⅔	⅓	Front ft., incl. intersections	10	both	10
Troy	50%	50%	Front ft., incl. intersections	3	Bonds	life of impvt.
Waverly	c. & gut.	rest	Lot frontage	....	budget	....
North Carolina						
Durham	⅔	⅓	Front ft., excl. intersections	10	Bonds	....
Washington	50%	50%	Front foot	10	Bonds	10
North Dakota						
Grand Forks City	80%	20%	Benefits	20	budget	20
Ohio						
Ashland	98%	2%	Front ft., excl. intersections	20	Bonds	10
Barberton	98%	2%	Front ft., excl. intersections	10	....	10
Bellefontaine	98%	2%	Front ft., excl. intersections	10	Bonds	10
Canton	98%	....	Front ft., excl. intersections	10	Bonds	serially
Chillicothe	98%	....	Front ft., excl. intersections	10	Bonds	10
Circleville	....	....	....	10	Bonds	10
Dayton	98%	2%	Front ft., incl. intersections	10	Bonds	20
East Cleveland	98%	2%	Benefits 50% intersections on repair	10-5	Bonds	10
Newark	98%	2%	Front foot	20	Bonds	10
Painesville	98%	2%	Front ft., excl. intersections	10	Bonds	10
Perrysburg	98%	2%	Benefits	10	Bonds	5-20
South Point	10%	15%	Rest by state & county on 50-50 basis. By front foot	10	budget	....
Washington C. H.	98%	2%	Front foot	10	Bonds	10
Wilmington	....	....	Front ft., excl. intersections	....	....	....
Oklahoma						
Altus	⅔	....	Front ft., excl. intersections	10	bonds	....
Blackwell	all	....	Front ft., excl. intersections	10	budget	10
Norman	all	....	By 1-4 block	10	budget	10
Wagoner	all	....	Front ft., excl. intersections	10	taxation	....
Oregon						
Ashland	all	....	Front ft., excl. intersections	10	bonds	10
Bend	all	....	Zone system	20	....	10
Dallas	all	....	Front ft., excl. intersections	10	budget	10
Pennsylvania						
Altoona	all	....	Front ft., excl. intersections	10	budget	....
Athens	⅔	⅓	Lot front of E	1	both	20
Bangor	....	....	....	....	both	20
Bellefonte	50%	50%	6 ft. by owners. Rest boro. Front ft. excl. intersections	....	budget	....
Carbondale	all	....	Front ft., excl. intersections	5	bonds	5
Corry	⅔	⅓	Front ft., excl. intersections	5	both	20
East Bangor	....	....	Boro & state	....	bonds	30
Erie	all	....	Front ft., incl. intersections	10	budget	....
Hollidaysburg	⅔	⅓	Front foot	12	budget	10-15
Jersey Shore	⅔	....	....	within year	tax	20-30
Meadville	all	....	Front ft., excl. intersections	10	bonds	15-30
Midland	⅔	⅓	Front ft., incl. intersections	within 6 mos.	bonds	3-5, 10-20
Northampton	....	....	General funds	....	both	20-30
Philadelphia	all	....	Front ft., excl. intersections. Repaving not assessed	....	bonds	15-30
Sayre	⅔	⅓	Front foot.	1	both	20
Sharon	all	....	Front ft., excl. intersections	8	both	5
Woodlawn	⅔	⅓	Front foot	....	bonds	10-30
Rhode Island						
Bristol	⅔	....	Rd. surface by town	....	both	20
Cranston	....	all	....	....	budget	....
South Carolina						
Union	....	all	....	....	budget	up to 40
South Dakota						
Rapid City	all	....	Front foot	10	budget	....
Tennessee						
Greeneville	⅔	⅓	Front. ft., excl. grad. & drain	10	bonds	10
Harriman	⅔	⅓	Front foot	5	bonds	1-20
Texas						
Childress	¼	....	Front ft. curbs & walks assessed against property	3	bonds	10-40
Cleburne	all	....	Front ft., incl. intersections	....	....	....
Greenville	⅔	⅓	Front ft., excl. intersections	5	bonds	20 yr. serial
Houston	all	....	Front ft., excl. intersections & dr.	5	bonds & gen fd	25 yr. serial
Lufkin	⅔	⅓	Front ft., excl. intersections	....	bonds	30
Navasota	⅔	⅓	Front ft., excl. intersections	....	bonds	20
Port Arthur	⅔	⅓	Front foot	4	bonds	40
San Angelo	....	....	Front ft., excl. excavations	4	bonds	30
Utah						
Ogden	....	....	Front foot	10	bonds	10
Washington						
Olympia	all	....	Area acc. to zones	10	....	....
Port Angeles	all	....	Area of lot ¼ intersections over ¼ block	10	....	10
Walla Walla	all	....	Zone system	10	....	10
West Virginia						
Moundsville	⅔	....	....	1	....	....
Wisconsin						
Augusta	....	....	Front foot of lot	10	both	3-20
Eau Claire	all	....	....	5	budget	....
Janesville	....	15-40%	Benefits	5-10	budget	10
Marinette	½	½	Front foot	5	budget	....
So. Milwaukee	all	....	Front ft., excl. intersections	5	budget	20
West Allis	all	....	Front ft., excl. intersections	10	bonds	10-20
Wyoming						
Laramie	....	all	....	....	budget	....

Recent Legal Decisions

MATERIAL MAN NOT DEPRIVED OF LIEN BY DIVERSION OF MATERIAL BY CONTRACTORS

The question has for the first time come before the New York Court of Appeals whether a material man who in good faith furnishes materials to be used in the completion of a contract for public works within the scope of the State Mechanics' Lien Law loses his right to a lien therefor because the contractor without his knowledge or consent has diverted the materials to some other purpose and has not in fact used them in the construction of the improvement as contemplated. The plaintiff in the case had delivered several lots of cement to the contractor for construction of a road who sold them to other parties, afterwards making an assignment to a bank. The court holds, Giant Portland Cement Co. v. State, 232 N. Y. 395, 134 N. E. 322, that in such circumstances the materialman should not be deprived of his lien under section 5 of the statute, which gives a lien to "a person . . . furnishing materials to a contractor . . . for the construction of a public improvement." He has "furnished" his materials when he has delivered them to the contractor in good faith for the purpose of being used in the improvement. The court says: "It is true that this construction of the act may at times result in injury to other lienors whose liens are subordinated to those of materialmen for materials furnished for, but not actually used in the construction of an improvement. But in our judgment, having in mind that interpretation of the statute which will be for the benefit of materialmen as a class, this possible disadvantage will be small compared with the expense and dangers which would follow an interpretation that a materialman, who had honestly furnished materials for the construction of an improvement, could only have a lien on proof that his material had actually gone into the improvement." The court pointed out that such an interpretation would be disadvantageous to contractors, because, if the lien right of the materialmen was impaired by the possibilities of diversion of the material, materialmen inevitably would be much less willing to trust contractors and enable them to complete contracts.

The court found support for its interpretation of the statute in the following decisions of courts of other states having statutes similar to that of New York: Burns v. Lowell, 68 Minn. 425; Frudden Lumber Co. v. Kinnan, 117 Iowa 93; Breckel v. Petticrew, 6 Ohio St. 251; Hercules Powder Co. v. Knoxville, L. F. & J. R. Co., 113 Tenn. 382; Bell v. Mecum, 75 N. J. L. 547; Salzer Lumber Co. v. Lindenmeier, 54 Colo. 491; Maryland Brick Co. v. Spilman, 76 Md. 337; White v. Miller, 18 Pa. St. 52; Kalbfleisch v. Harley, 34 Ont. L. R. 268.

BROKEN OVERARCHING LIMB OF A TREE NOT A STATUTORY DEFECT IN THE STREET

The Supreme Judicial Court of Massachusetts holds, Andresen v. Town of Lexington, 134 N. E. 397, that a limb of a tree growing on private property, which arched over a sidewalk and fell upon the street after being severed by the wind and sustained for a time by telegraph wires, injuring a pedestrian, was not a defect in the way within a statute imposing liability on the municipality because of death from a defect or want of repair of any way.

VERBAL AGREEMENT BY MUNICIPAL OFFICER TO PAY FOR EXTRA WORK VOID UNDER EXPRESS PROHIBITION OF CITY CHARTER

The Tennessee Supreme Court holds, J. A. Kreis & Co. v. City of Knoxville, 237 S. W. 55, that a verbal assurance by a city's commissioner of waterworks to the contractor for the construction of a pump pit for the city that the contractor would be paid for extra work in enlarging the pit, the necessity for which became apparent during its construction, was unenforceable, the city charter providing that "no contractor shall be allowed anything for extra work caused by an alteration or modification, unless an order is made or an agreement signed by the contractor and approved by the board of public works. The court said that such provisions in a city's charter "have the effect of protecting the city's interest, and tend to prevent extravagant and unwarranted expenditures of the city's funds, and they cannot be disregarded." The fact that the board subsequently agreed to compromise the claim was held insufficient to give it validity.

PREPARATION OF PLANS FOR PROPOSED MUNICIPAL LIGHTING SYSTEM

The New Jersey Supreme Court holds, Franklin v. Horton, 116 Atl. 176, that an ordinance of the city of Millville employing an electrical engineer to prepare plans and specifications for an electric light distributing system for public lighting and for compensation for such services is valid without the necessity of adopting an ordinance for the construction of a municipal lighting plant, since the governing body of the city may, under the New Jersey statute of 1917, cause such a distributing system to be constructed either by the city or by a contractor agreeing to furnish the street lighting. The preparation of the plans and specifications is not work or the furnishing of materials, supplies or labor requiring advertisement for bids.

GENERAL CONTRACTOR HELD NOT LIABLE TO SUB-CONTRACTOR'S EMPLOYEES WHO HAD EMPLOYED SUB-CONTRACTOR TO COLLECT MONEY DUE THEM

In an action against the general contractor for hauling gravel in the construction of a road, it appeared that the plaintiffs were employed by a subcontractor, performed the work for him and subsequently constituted him, although their employer, their agent to collect and pay the money over to them. He collected the money, but failed to pay them. The Arkansas Supreme Court holds, C. A. Keese & Co. v. Kirk, 237 S. W. 680, that the subcontractor was liable to the plaintiffs, but the general contractor was not. It was not incumbent on the latter to see that the subcontractor, as the plaintiffs' agent, paid over to them the money they authorized him to collect.

NEWS OF THE SOCIETIES

CALENDAR

June 4-6—AMERICAN ASSOCIATION OF ENGINEERS. 8th annual convention. Salt Lake City, Utah.

June 5-7—NATIONAL CONFERENCE ON CITY PLANNING. Annual conference. Springfield, Mass. Secretary, F. Shurtleff, 60 State St., Boston, Mass.

June 6-8—CONFERENCE OF NEW YORK STATE MAYORS AND OTHER CITY OFFICIALS. Annual meeting. Poughkeepsie, N. Y. Secretary, W. P. Capes, 25 Washington Ave., Albany, N. Y.

June 7—NORTHWEST SECTION, NATIONAL ELECTRIC LIGHT AND POWER ASSOCIATION. Boise, Idaho.

June 12—AMERICAN FEDERATION OF LABOR. Cincinnati, Ohio.

June 12-15—CANADIAN GOOD ROADS ASSOCIATION. Ninth annual meeting. Empress Hotel, Victoria, B. C. (Change of date.)

June 13—ENGINEERING SOCIETY OF AKRON. Akron, Ohio.

June 16-17—ENGINEERING INSTITUTE OF CANADA, Provincial meeting. Vancouver Hotel, Vancouver, B. C.

June 19-22—AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Summer meeting. Clifton Hotel, Niagara Falls.

June 20-23—SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual convention. University of Illinois.

June 21-22—LEAGUE OF MINNESOTA MUNICIPALITIES. Annual convention. Crookston, Minn.

June 21-22—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention. Portsmouth, N. H.

June 26-30—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention. Niagara Falls, Ont.

June 26-July 1—AMERICAN SOCIETY FOR TESTING MATERIALS. 25th annual meeting. Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

Aug. 15-18—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Fiftieth convention. Municipal Auditorium, San Francisco, Cal. Secretary, James J. Mulcahey, Chief, Yonkers, N. Y., Fire Dept.

Aug. 28-Sept. 2—NATIONAL SAFETY CONGRESS. Detroit, Mich.

Sept. 11-15—ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. New Auditorium, Cleveland, Ohio.

Sept. 12-15—NEW ENGLAND WATER WORKS ASSOCIATION. 41st annual convention. New Bedford, Mass. Secretary, Frank J. Gifford, Tremont Temple, Boston, Mass.

Sept. 25-28—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention. Hot Springs, Ark.

Oct. 9-13—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. Cleveland, Ohio.

Oct. 16-19—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. Cleveland, Ohio.

Nov. 15-16—NATIONAL INDUSTRIAL LEAGUE. Annual meeting. New York City. Secretary, J. H. Beck, Chicago.

Dec. 7-13—NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING. New York City.

AMERICAN SOCIETY OF CIVIL ENGINEERS

The fifty-second annual convention will be held at Portsmouth, N. H., June 21st-22d. The headquarters of the society, secretary's office, etc., will be at the Hotel Wentworth, a shore resort, opened exclusively for the convention. The hotel is operated on the American plan, at rates varying from $7 to $9 per day.

Program, June 19th and 20th—Excursions around Boston, Worcester, and Clinton, Mass. Persons who wish to see historical and engineering points of interest around Boston should call at the rooms of the Boston Society of Civil Engineers, 715 Tremont Temple (88 Tremont street), at whatever time may be most convenient and arrangements will be made for transportation and guides. Such trips will be made in small parties so as to conform to individual desires. Members wishing to see some particular work or place will find it of advantage to communicate in advance with the chairman of the Local Committee.

A special arrangement will be made for those particularly interested in water supply and sewage disposal to vist the municipal sewage disposal plant, Worcester, Mass., and Boston water supply, Clinton, Mass. Communicate with Mr. Harrison P. Eddy, 14 Beacon street, Boston, Mass.

Golf tournament at the links located near the Hotel Wentworth, with suitable prizes.

June 21st—Addresses by Governor Brown of New Hampshire and President Freeman, followed by a business meeting. Papers will be presented by L. C. Wason, "Tests of Concrete in Sea Water"; W. G. Atwood, "Marine Borers" W. K. Hatt, "Progress in and Importance of Highway Research"; Edward B. Wardle, "The Wood Pulp Industry"; Harry W. Clark, "Wastes from a Wood Pulp Mill Chemically Considered"; George C. Whipple, "Pollution of Streams by Paper Mill Wastes"; Mr. O. Lefebvre, "Problems in Connection with the St. Maurice River Regulation"; James H. Brace, "The Gouin Dam on the St. Maurice River."

2 p. m.—Boat trip to Isle of Shoals, weather permitting, or continuation of the technical program.

8 p. m.—A paper will be presented by Frank W. Hodgdon, "Shore Protection and Harbor Development Work on the New England Coast," with discussion led by Henry S. Adams, Frederic H. Fay, Charles R. Gow, and W. Willing, followed by a paper by J. W. Rollins, "Difficult Foundation Problems for Piscataqua Bridge at Portsmouth."

For the ladies—A bridge tournament with suitable prize.

June 22d—Excursion Trip to Casco Bay. 9 p. m., informal reception and dance.

June 23d and 24th—Trip to White Mountains. Arrangements will also be made for excursions around Boston for those who do not wish to go to the White Mountains.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

At the annual business meeting of the American Institute of Electrical Engineers, held in New York, May 19, the following officers were elected:

President, F. B. Jewett, New York; vice-presidents, G. Faccioli, Pittsfield, Mass.; W. I. Slichter, New York; R. F. Schuchardt, Chicago; H. W. Eales, St. Louis (re-elected); H. T. Plumb, Salt Lake City, Utah; managers, H. M. Hobart, Schenectady, N. Y.; Ernest Lunn, Chicago; G. L. Knight, Brooklyn, N. Y.; treasurer, George A. Hamilton, Elizabeth, N. J. (re-elected). At the meeting of the Board of Directors held on the same date, F. L. Hutchinson was re-elected secretary of the Institute for the coming administrative year.

AMERICAN ROAD BUILDERS' ASSOCIATION

The meeting of the Association held May 15th adjourned to meet again at the Automobile Club of America, 247 West 54th street, New York, N. Y., on June 15th, at 3 p. m. (daylight saving time).

PERSONALS

Merrill, Leland G., City Engineer of Parkersburg, West Va., has resigned to accept a position with the West Virginia State Highway Commission and will be located in Division No. 3.

Erwin, M. C., sanitary engineer of the state bureau of sanitary engineering, has resigned to become city engineer and sanitarian of Port Arthur, Tex.

Robert Whitten has opened offices at 4614 Prospect Avenue, Cleveland, Ohio, for professional practice in general city planning and city zoning. He will be associated with A. D. Taylor, landscape architect and town planner, with a thoroughly equipped technical and engineering organization.

Mr. Whitten is at present retained as general city planning consultant by the official city plan commissions of Atlanta, Georgia and Indianapolis, Indiana. He is a member of the Board of Governors of the American Institute of City Planning and of the National Conference on City Planning.

Charron, Henry S., has been appointed superintendent of the water department of Burlington, Vt., to succeed J. Frank Kidder.

Thompson, V. A., city manager, and L. B. Hitchcock, city engineer, of Phoenix, Ariz., have both resigned their positions, due, it is believed, to dissatisfaction with political interference.

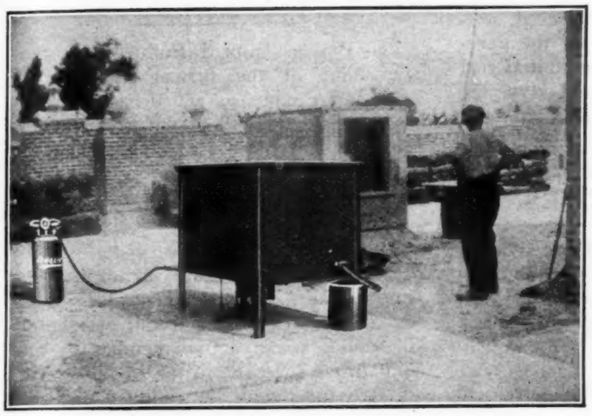
Smith, J. Waldo, for many years chief engineer of the Board of Water Supply, City of New York, has resigned, and Thaddeus Merriman, deputy chief engineer of the Board of Water Supply, has been appointed to succeed him.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

HOTSTUF PITCH AND ASPHALT KETTLE

This kettle, manufactured by the Aeroil Burner Company, Inc., is intended especially for use with the Aeroil burner and is provided with a melting shelf on which the broken pitch or asphalt begins to melt two minutes after the burner is started. The melted material runs into a separate reservoir where it is maintained at the proper temperature by the escaping waste gases and from which it is drawn off into a pail as required. Pitch is melted at the rate of 50 pounds in four minutes at an average fuel cost of eighty cents per ton of pitch melted.



AEROIL BURNER COMPANY'S HOT STUFF PITCH AND ASPHALT KETTLE

The kettle is 50 inches long, 36 inches wide and weighs 375 pounds and has a capacity of 100 gallons. It is portable, strong, durable, efficient, easy to handle and to clean, and eleminates smoke, fire danger, coking, splashing and waiting for hotstuff. It saves the money usually spent for extra kettle bottoms, will do the work of two ordinary kettles, and can be furnished mounted either on lead or on wheels.

REVOLVING SEWAGE SCREENS

The sewage screens now being installed by the Sanitary District of Indianapolis, for the new sewage disposal plant are of the improved inward flow cylindrical type with axial discharge that prevents the entrance of the sludge and leaves it accessible in the pit whence it is easily removed while the clarified effluent escapes continuously at the end of the cylinder and the screen can be easily cleaned from the exterior.

The screens, of which there are 13, are set in individual wells containing sewage laden water to a depth of approximately 2 feet. As they revolve, the liquid passes through the screen cloth to the interior of the drum and is discharged through the drum head to a trough leading to the settling tank. Meanwhile the solids are removed from the tank by means of scraper conveyors.

The screens, manufactured by the Chain Belt Company, are each 6 feet in diameter and 7½ feet long. They are made almost entirely from bronze to prevent corrosion. The framework is similar to a squirrel-wheel and around it are wrapped two courses of screening, the inner one having a very open mesh, while the outer one is fine enough to prevent practically any of the solids from entering the drum.

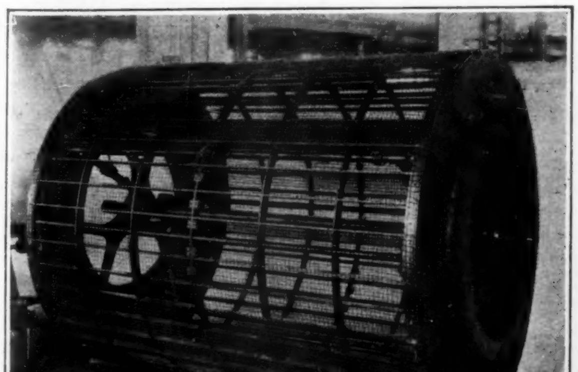
The screens are mounted on through shafts in bronze bearings and are driven by Rex Chabelco steel roller chains operating over Temperim sprockets.

DESCHANEL CABLEWAYS

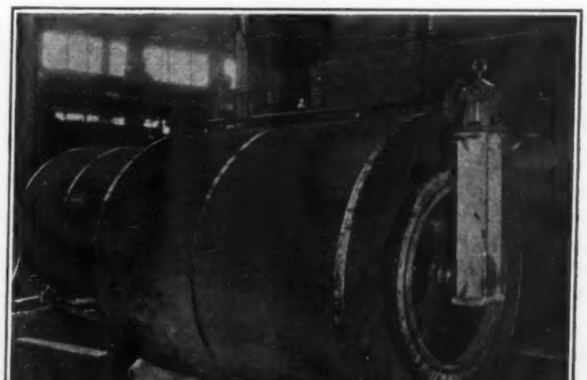
Cableways manufactured by the Deschanel Engineering Corp. are designed for unloading materials directly from railroad cars and barges to ground storage, other secondary storage or to bunkers and coal bins, as well as for reclaiming materials or for removing ashes from boiler rooms and loading railroad cars, trucks, and for depositing materials in ground or overhead storage, all operations being performed with the same equipment without any change.

When headroom is low, the cableways of a two-traction rope type are operated with intermediary A-frames, carrying the traction ropes on saddles. When height is unlimited the single traction rope type is used with towers, the tail tower being moveable if requisite to cover a larger storage and reclaiming area.

The cableways are operated by a two-drum reversible hoist controlled by only two levers for all operations of closing, lifting, conveying and dumping the clamshell bucket, thus eliminating complicated mechanism and foot brakes and permitting the hoisting unit to be located on ground while the operator can be stationed at any height to command a clear view of the entire length of the cableway and all operating power is



FRAMEWORK OF CHAIN BELT COMPANY'S SCREEN COVERED WITH OPEN MESH



CHAIN BELT COMPANY'S SEWAGE SCREEN COMPLETE WITH SPROCKET CHAIN DRIVE

furnished by a continuous electric motor or by a gasoline engine as desired. The cableway is equipped with the Deschanel cableway bucket of the completely automatic bridge type, clamshell design of high efficiency for unloading and reclaiming material.

The cableway traction carriage frame is of rigid construction with positive alignment and has large trolley wheels and sheaves with chilled rims fitted with high duty Hart roller bearings that insure smooth wear-resisting running.

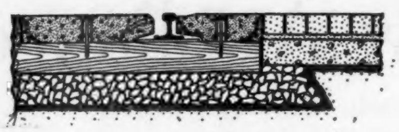
The manufacturers also provide skip hoists for unloading from cars to ground storage or overhead, monorail hoists for the same purpose furnished with traveling cab or pull chain operated from the ground; and a full line of belt, flight and spiral conveyors.

STEEL PAVING GUARDS

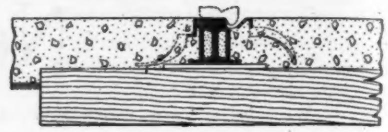
Guards for protecting the longitudinal edges of brick, stone, asphalt, or concrete pavements are manufactured by the W. S. Godwin Company, Inc. By their use it is claimed that street railway paving is protected against the wave motion of the rails, against lateral rail movement, that seepage below the surface and contact between the pavement and the car wheel are prevented, and that a rigid lateral support and sufficient strength above the cross-ties are provided.

The guards are made from square or oblique-angle sections with the lower end sheared and bent so as to provide integral anchorages projecting into the concrete pavement or foundation. It is claimed to be the only proven protective agent that permits of rigid paving construction and elastic track construction adjacent to each other.

The installation of steel paving guards permits the satisfactory use of broken stone or natural soil under the ties, thus effecting a large saving of concrete. It also allows the safe use of sheet asphalt or other bituminous surface over the entire railway area. The manufacturers estimate that its use in place of block



PRECAST CONCRETE RAILWAY CROSSING PROTECTED BY GODWIN COMPANY STEEL GUARDS



SIX-INCH CONCRETE PAVEMENT PROTECTED BY GODWIN STEEL GUARDS

liners nets a saving in cost of from four to forty-three cents for liners 8 to 20 inches wide for single width and a saving of repairs of forty-four cents. The liners are equally suited for groved or tee rails and are suitable for pre-cast concrete railway track when hard surface pavements are made adjacent to unpaved railway tracks. The use of steel guards to protect the edges of the pavement is claimed to give lower initial cost and greater protection without involving any material cost for removal if the track area is subsequently paved.

GODWIN COMPANY'S GUARDS PROTECTING THREE-INCH ASPHALT PAVEMENT ADJACENT TO GROOVED RAIL

INDUSTRIAL NOTES

Payne Dean, Ltd., 103 Park avenue, New York City, manufacturer of Dean control for electrical operation of water, gas and high pressure steam valves, has established offices in Pittsburgh and Chicago, with C. N. Burrago in charge of the former and A. H. Kohlbusch in charge of the Chicago office.

On May 1st the New York offices of the American-LaFrance Fire Engine Company, Inc., and of S. F. Hayward & Company, their subsidiary, were moved from West 54th street to the new Fisk Building, 57th street.

The Hiram Phillips Engineering Co., St. Louis, Mo., successor to W. R. Heagler & Sons, Paragould, Ark., and Hiram Phillips, St. Louis, will specialize in drainage, flood protection, irigation, sewerage and water supply.

The U. S. Cast Iron Pipe & Foundry Company announces that it has opened a new office at the Interstate Building, Kansas City, Mo., which will be in charge of Mr. D. W. Pratt, sales agent.

The Chicago office of the Elgin Sales Corporation was moved to 10 S. La Salle street on March 31.

The Wayne Tank & Pump Co. is the new name of the former Wayne Oil Tank and Pump Co., which has enlarged its business and will manufacture water softening machinery and other water handling apparatus. The address remains the same—Fort Wayne, Ind.

The Frazier-Ellms-Sheal Co., Illuminating Building, Cleveland, Ohio, announce the association of Mr. J. T. Martin, former Water Commissioner of Cleveland, as an active member of the company in the capacity of vice-president and treasurer for the conduct of their general engineering business.

Mr. Martin has been actively engaged for over 20 years in water works projects, covering construction of tunnels, reservoirs, distribution system, filtration and power plants, water works accounting and administration.

The Orton & Steinbrenner Co. of Chicago and Huntington, manufacturers of locomotive cranes, clamshell and orange peel buckets and coal crushers, have made arrangements with J. Ross Bates, formerly connected with Wonham Bates & Goode Trading Corp. of New York and Boston, to represent them in the New England States and New York City.

Mr. Bates has offices at 136 Liberty Street, New York City, and 128 School Street, Watertown, Mass.

The Hammond-Byrd Iron Co., of Birmingham, Ala., with operating offices in Chicago, San Francisco and New York, will re-enter the field to sell and distribute cast iron water main, gas main and fittings.

The Kennedy Valve Mfg. Co. has announced the following changes in its organization—the appointment of H. D. Kane as assistant to C. A. Burgess as traveling representative with headquarters at Elmira, N. Y.; of James P. Murphy as assistant to S. C. Mead, Chicago branch manager; and of John J. Milliken as assistant to E. H. Koone, eastern sales manager. Also, an additional office has been opened in the L. C. Smith Bldg., Seattle, Wash.